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CARCINOMA OF THE FALLOPIAN TUBE*

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BOSTON

CARCINOMA of the fallopian tube is commonly regarded as a rare disease. According to Sänger and Barth,[1] Orthmann in 1886 reviewed the 13 cases in the literature previous to that time, only to exclude them as representing metastatic disease from a primary source in the uterus or ovary. Thus he receives priority in reporting the first undoubted case of primary carcinoma of the tube. As the cases have been encountered in surgical practice or pathological laboratories they have found their way into the literature, accompanied by a review of the cases already recorded. The accumulation to an approximate total of 350 cases has been slow, with a large number of authors contributing. Orthmann's original case in 1886 was followed by 17 cases collected by Sänger and Barth[1] in 1895. Peham[2] was able to collect 63 cases in 1902. Doran[3] carefully reviewed the 100 cases reported up to 1910. Liang[4] gathered 214 cases in 1926, of which 107 were from the German literature. This was increased in 1929 to 230 cases by Wharton and Krock,[5] who also added 14 proved specimens, 5 of these from Johns Hopkins Hospital and the surrounding hospitals. Nürnberger[6] materially increased this number, reporting 301 cases from 1886 to 1931. To this number Robinson[7] in 1936 added 48 cases, bringing the total to 349 in the literature up to and including 1935. Since that time the reported cases have appeared almost entirely in foreign journals.

While the total has been slow in its accumulation, it is of some interest to note that Kahn and Norris[8] observed in 1934, while reporting 2 cases in which the patients were the youngest (eighteen years old) so far encountered, that there had been a distinct increase in the incidence of the disease during the past decade. Until 1932 there were no recorded cases of primary carcinoma of the tube in the surgical or pathological files of the Massachusetts General Hospital. Since that time 6 proved specimens have been received. Possibly the reason for the apparent increased incidence is due, as Kahn and Norris[8] suggest, to the awakened consciousness of carcinoma among the medical profession. Certainly more surgical specimens are being presented to the pathologist for confirmation of the gross diagnosis. Two cases encountered within my surgical experience, with the knowledge of a third case, all in the space of one week confirm the impression that while the disease is undoubtedly rare it is of the utmost importance to any surgeon interested in gynecological practice. For that reason 8 cases from the records of the Massachusetts General, Pondville and Vincent hospitals have been reviewed and confirmed, and are here reported.

Despite the fact that an appreciable number of proved specimens of carcinoma of the fallopian tube have been reported, the experience of any one individual is of necessity small. The incidence in the various hospital centers is roughly similar. Wharton and Krock[5] report 5 cases among 35,000 gynecological patients at Johns Hopkins Hospital. Gupta[9] in Calcutta found 1 specimen among 6000 patients with pelvic disease. Barrows[10] noted 3 cases among 30,000 patients on the gynecological wards at the Bellevue Hospital in New York City. Anspach[11] encountered 1 case in 19,439 patients on the gynecological service at the University Hospital in Philadelphia. The frequency among tumors of the genital tract is approximately 0.5 per cent.

The important element in the consideration of carcinoma of the tube lies not in its rarity but in the fact that it represents the most malignant form not only of genital cancer but of cancer anywhere in the body. It is apparent from the literature that a substantial number of patients have had carcinoma of the fallopian tube. In view of the general experience that the survival rate is less than 4 per cent, it is also apparent that nearly all who have had the disease succumbed to it. Despite the many reports in the literature, diagnostic errors made pre-

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operatively are about as frequent as they were twenty years ago. Inasmuch as the chance of cure varies directly with the stage of the disease encountered, it is obvious that there can be no improvement in prognosis until an earlier diagnosis is made. From a consideration of the 8 cases here reported and the data in the literature certain observations may be made which, if considered, may lead at least to suspicion of the correct diagnosis. Dannreuther's[12] experience confirms our own, and the possibility of making a correct and early preoperative diagnosis gives increasing hope for a more favorable outcome.

There are certain factors which contribute to the likelihood of error in diagnosis. The chief of these, of course, is that because of the rarity of the disease it is almost never considered as a possibility. Furthermore, because of its location, direct observation, such as is possible in the breast, is out of the question. Carcinoma of the stomach, which gives a total salvage figure similar to that of carcinoma of the tube, may be diagnosed by x-ray study, but x-ray examination of the pelvis for soft-part tumor is inconclusive. Consequently the chief reliance is on consideration of the symptomatology and the physical findings. Here also there are pitfalls, for disturbances of function are too often attributed to the menopause. The vague, inconstant symptoms of lower abdominal soreness or pain may be associated with a variety of pelvic diseases. Not much attention is paid to the symptoms either by the patient or her physician, although many have consulted their physicians because of it. Most often it has been ignored unless accompanied by a recently noted enlargement of the abdomen or sudden appearance of bleeding. Where pelvic examination has followed the report of lower abdominal symptomatology the results are often unsatisfactory, for it is an unfortunate fact that many of these patients are obese. An atrophic, inelastic vagina combined with a thick layer of abdominal-wall fat is not conducive to an accurate evaluation of adnexal disease. It is small wonder, then, that the correct diagnosis is not made more often, yet there are a few pathognomonic signs and symptoms which should arouse suspicion of the possible existence of carcinoma of the fallopian tube.

AGE INCIDENCE

Judging from the time at which the disease occurred in this group of 8 patients, it may be regarded primarily as a disease of the climacteric period. Six patients were from three to twenty-two years past the menopause. The oldest patient was seventy-two, the youngest forty. In a much larger group colleced by Wechsler,[13] 53 of 192 patients had passed the menopause; the highest incidence was found between the ages of forty and fifty-five, where 66 per cent of the cases were concentrated. Carcinoma of the tube may be found at an earlier age, for in addition to the 2 cases reported by Kahn and Norris,[8] Johnson and Miller[14] also report a case in a girl of eighteen. Norris[15] operated on a girl of twenty-seven with carcinoma in one fallopian tube. Thus, while the disease may occur early in the menstrual life, the age distribution is in decided contrast to that of carcinoma of the ovary, with which it is most often confused; for although about the same percentage of cases occurs after the menopause, a much higher percentage is noted before the age of forty.

ETIOLOGY

The origin of the disease is obscure, despite the apparent history of antecedent salpingitis in many cases. Sänger and Barth[1] suggested primarily the theory of a preceding salpingitis as a predisposing cause. Ewing[16] and many others have accepted this viewpoint. Certainly there is much in the clinical history of such patients to suggest salpingitis. Three of the 8 patients in this group had such a history. Many of them are sterile, which again is suggestive. The gross pathology suggests an enlarged hydrosalpinx. But as Wechsler,[13] Liang,[4] Gupta,[9] and others have observed, it is rather surprising in view of the common finding of salpingitis that more cases of tubal carcinoma are not encountered. Many cases have apparently no record of previous pelvic inflammation. Spencer[17] and Charache[18] each report a single case of carcinoma of the tube arising in a virgin. Doran,[3] in an exhaustive review of 100 cases made in 1910, suggested another possible source: "malignant degeneration of benign papillomata found frequently in catarrhal and suppurative conditions of the tube." It would seem that the assumption of such a course is largely based on inference. Suggestive confirmation is noted in a case reported by Scott and Oliver[19] where a negative curettage performed twelve years after the menopause was followed eleven years later by final confirmation of tubal carcinoma. Thus while many patients give a preceding history of pelvic inflammation and tend to be sterile, salpingitis as the sole precursor of malignancy of the tube is not a tenable theory. It constitutes, however, suggestive information which should arouse suspicion of the possibility of tubal carcinoma.

SYMPTOMS

Bleeding

The commonest finding in this series was the sudden onset of bleeding from three to twenty-two years after the menopause. In nearly every case the bleeding was continuous, although often

of no great amount. In 1 case bleeding had occurred for three days one year previous to admission, never to reappear. Recognition of the disease finally came through the finding of an enlarging abdominal tumor.

The experience with this group as regards postmenopausal bleeding is quite generally confirmed by other observers. Wharton and Krock[5] found 5 cases after the menopause, with bleeding as the important symptom in 4. Anspach[11] noted bleeding in the 2 cases in the climacteric period which he encountered. Wechsler[13] observed 30 of 53 patients presenting menorrhagia as the most prominent symptom.

It is usually taught that postmenopausal bleeding is associated with carcinoma of the uterine fundus. Hence, with the attention of the surgeon directed primarily toward the endometrial cavity, the finding of an atrophic uterus with a negative endometrium practically excludes the thought of cancer from the mind of the operator. Carcinoma of the tube, however, frequently gives just such a picture. With a history of bleeding, carcinoma of the ovary is rarely present unless the endometrium is involved or hyperplasia occurs, suggesting a physiological type of tumor. Thus a curettage becomes diagnostic in the presence of postmenopausal bleeding, for with the finding of frank cancer or hyperplasia we should suspect the ovary; with the finding of a negative endometrium, the tube.

It is not uncommon to have the disease become apparent while the patient is under close observation, whereas it had never been considered before. This occurred in 3 of the 8 cases in this series. Bleeding continued despite a negative curettage two and a half years before admission in one patient and five months before in another. In one of Anspach's[11] cases a negative curettage had been done eight months previously. There are several similar incidents in the literature. Thus we may sound a warning that if no adequate cause has been found to explain bleeding following a curettage it is necessary to suspect carcinoma of the adnexa and particularly of the tube, and to watch for a reappearance of the bleeding.

Pain

As in other reported series, an indefinite sense of lower abdominal pain or soreness was consistently noted in the cases here reported. Because of its variable character and location not much attention was paid to it until it was accompanied by enlargement of the abdomen or the sudden appearance of bleeding. Most writers agree that pain appears early in the disease, and in this respect tubal carcinoma differs from carcinoma of the uterus and ovary.

As others, notably Wechsler,[13] have noted, pain of an intermittent colicky nature may be associated with a sudden profuse discharge of variable character from the vagina, after which the pain subsides. This was true in 4 of the 8 cases. An acute episode becomes superimposed upon the pre-existing symptomatology with the sudden appearance of lower abdominal pain, pyrexia, chills, spasm and a palpable tender mass, together with vaginal discharge. The diagnosis of a probable flare-up of an antecedent pelvic inflammatory disease or of an inflammatory process following a twist of an unsuspected ovarian cyst is usually made. Such a train of events was present in 3 cases. A large hydrosalpinx was found in all of them at operation, suggesting an old chronic salpingitis as precursor of the disease. The finding in the past history of similar episodes years before is suggestive confirmation.

Wechsler[13] observed this group of symptoms in 25 per cent of his 192 reported cases. If Robinson[7] is correct in his observation that the fimbriated ends of the tube close late in the disease, the mechanism of its development is understandable. With the huge distention of the thin-walled tube by the fluid contents of tumor necrosis, peristalsis of the tube ensues with the attempt to pass the material into the uterus and vagina. During the process, intermittent colicky pains are present, which are relieved following expulsion. Such a history is suggestive of tubal carcinoma and is amply confirmed by the experience of most observers.

PATHOLOGY

The most important single fact concerning the pathology of tubal carcinoma revolves around the assertion by Hurdon,[20] Cullen,[21] Callahan, Schiltz and Hellwig[22] and others that the tubal wall is involved late in the disease. Distant metastases are noted, particularly in the groin, before the tubal wall becomes involved. This proved to be true of one of the cases reported below. It thus becomes possible to make the mistake of calling the thin-walled, hugely dilated, retort-shaped tube a simple hydrosalpinx, as was done in another case in this group. The extension is largely by lymphatics, to the lumbar and iliac nodes, as in carcinoma of the fundus of the uterus, on the one hand, or to the external iliac and sacral nodes, as in carcinoma of the cervix, on the other. Other routes of extension by continuity or contiguity are, as Robinson[7] points out, purely arbitrary divisions of lymphatic spread. Metastases are usually limited to the lower abdomen, the liver rarely being involved. Ascites and large abdominal masses are late manifestations of the disease. According to McGlinn and Harer,[23] 30 per cent of tubal carci-

nomas show metastases. Another important fact is that primary carcinoma of the fallopian tubes is frequently bilateral. Thus there is double danger in suspecting that a single large hydrosalpinx is benign, for the apparently normal-looking tube on the opposite side may also be the site of malignancy. Most pathologists agree that the usual point of development within the tube is in the outer two thirds. In most cases the fimbriated ends are found closed. Robinson[7] believes that this is a late phenomenon in contrast to gonorrheal salpingitis, in which it occurs early. As the fimbriae close, the tube may reach enormous dimensions as the lumen becomes distended with secretions and products of tumor necrosis. This may account for the sudden development of acute lower abdominal symptoms and colicky pain, as observed in 1 of the 8 cases presented here.

Microscopically little is gained by attempting to divide the malignancy into different types of carcinoma. Sänger and Barth,[1] Friedenheim[24] and other pathologists have outlined three distinct types: papillary, papillary alveolar and alveolar. The earliest forms of tubal carcinoma are papillary, but inasmuch as they merge one into the other the division is of no great significance and, as Liang[4] pointed out, it is both superfluous and confusing. Robinson[7] has observed two types within the same tube with "normal-looking tubal epithelium, except for loss of cilia, next to definitely cancerous." The important fact to determine microscopically is whether the carcinoma actually arises within the tubal epithelium or is a secondary invasion from carcinoma elsewhere, namely the uterus or ovary. In this regard the late involvement of the tubal wall speaks for primary carcinoma of the tube in contrast to metastatic carcinoma, where carcinomatous implants may be found within the wall of the tube with a normal mucosal epithelium above.

In most cases the uterus is atrophic with a negative endometrium, in contrast to the slightly larger uterus with hyperplastic endometrium associated with carcinoma of the ovary. The fact that many carcinomas of the tube have simple ovarian cysts on the same side may be confusing in determining the site of origin of the primary carcinoma. This proved to be the case in 7 cases in the present series.

TREATMENT

The treatment of choice is total hysterectomy together with bilateral salpingo-oophorectomy. This is important in view of the nature of the lymphatic spread of metastases, which closely simulates that of carcinoma of the fundus. The chief source of error lies in the operator's belief that he is dealing with a large hydrosalpinx of benign character, which it resembles in the gross because of its thin wall. Bleeding after the menopause is so rare with simple pelvic inflammation as to be practically nonexistent. It is an excellent general rule in dealing with adnexal disease, whether of tube or ovary, in any case where the suspicion of carcinoma has been raised to have the specimen opened in the operating room. Thus the temptation to do a simple salpingectomy will be avoided. As so often happens when the patient is in the climacteric state, a small, atrophic uterus with a negative endometrium is encountered. If the suspicion of carcinoma of the adnexa has not been raised there is a temptation to give the patient radium. As Anspach[11] points out, this procedure is dangerous, for the subsequent symptoms of carcinoma may be masked.

As regards the use of x-ray treatment postoperatively, little knowledge can be obtained from this small series. Where it had been given the treatment was evidently prophylactic rather than intensive with the hope of cure. This procedure appears to be erroneous, for the total salvage after three years as reported in the literature in those cases in which no x-ray treatment was given is less than 4 per cent. Intensive x-ray therapy would probably not make this survival figure worse and might improve it.

PROGNOSIS

Were it not for the hope of improved results from the combined use of surgery and x-ray, together with the possibility of earlier diagnosis, the survival figure of less than 4 per cent after three years would be enough to justify considering the treatment of tubal carcinoma as hopeless. Charache[18] was able to find only 7 cases where survival had been longer than three years; Haupt's[25] maximum was twenty years, Fonyó's[26] thirteen years, Zweifel's[27] eight years, Jahkola's[28] seven years and Benthin's[29] five years. Recently Norris[15] reported a patient alive and well nineteen years after operation. Kaplan[30] sounds an encouraging note for the combined use of surgery and external radiation by reporting a patient alive without disease four and a half years after operation. In this instance x-ray treatment followed operation after six months. The ideal form of treatment would be to have x-ray therapy directly follow operation.

SUMMARY AND CONCLUSIONS

Carcinoma of the tube, though regarded as a rarity, has been reported 350 times, with an increasing incidence during the last decade.

The age incidence is in decided contrast to carci-

noma of the ovary, with which it is most often confused.

Although not the only possible source, the history of sterility and a preceding salpingitis in a patient with suggestive symptoms should arouse suspicion of tubal carcinoma.

Bleeding is the earliest and most important single symptom.

Pain appears early in the disease in contrast to carcinoma of the fundus or ovary.

Intermittent colicky pain, associated with a sudden profuse vaginal discharge of pus or blood, followed by relief of pain, is suggestive of carcinoma of the fallopian tube.

Because of late involvement of the tubal wall, the gross findings suggest a benign hydrosalpinx; such a diagnosis leads to error in proper operative treatment, namely total hysterectomy and bilateral salpingectomy.

The total salvage without x-ray treatment is less than 4 per cent of three-year cures. Carcinoma of the tube is the most malignant form of genital cancer.

The most important single fact is the necessity for suspecting the probable existence of a tubal carcinoma where bleeding has recurred after a negative curettage in an atrophic uterus.

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REFERENCES

1. Sänger, M., and Barth, J.: Die Neubildungen der Eileiter. In Martin, A.: *Die Krankenheiten der Eileiter.* 411 pp. Leipzig: Eduard Besold, 1895. P. 252.
2. Peham, H.: Das primäre Tubenkarzinom. Ztschr. f. Heilk. **24:**317-392, 1903.
3. Doran, A.: Primary cancer of the fallopian tube: with a second series of tables of reported cases. J. Obst. & Gynaec. Brit. Emp. **17:**1-23, 1910.
4. Liang, Z.: Was lehrt das primäre Tubencarcinom in pathologischer Hinsicht? Virchows Arch. f. path. Anat. **259:**577-607, 1926.
5. Wharton, L. R., and Krock, F. H.: Primary carcinoma of the fallopian tube: a series of fourteen cases. Arch. Surg. **19:**848-870, 1929.
6. Nürnberger: cited by Robinson.[7]
7. Robinson, M. R.: Report of three cases of primary cancer of fallopian tubes: with summary of cases omitted from Nürnberger's report (1931) and those recorded to 1935. Am. J. Obst. & Gynec. **32:**84-90, 1936.
8. Kahn, M. E., and Norris, S.: Primary carcinoma of fallopian tubes. Am. J. Obst. & Gynec. **28:**393-402, 1934.
9. Gupta, N.: Primary papillary carcinoma of the fallopian tubes. J. Obst. & Gynaec. Brit. Emp. **38:**839-843, 1931.
10. Barrows, D. N.: Primary carcinoma of fallopian tube, with report of three cases. Am. J. Obst. & Gynec. **13:**710-719, 1927.
11. Anspach, B. M.: Early diagnosis of adnexal cancer. Am. J. Obst. & Gynec. **20:**571-581, 1930.
12. Dannreuther, W. T.: Primary carcinoma of fallopian tube: with report of case. Am. J. Obst. & Gynec. **30:**724-727, 1935.
13. Wechsler, H. F.: Primary carcinoma of fallopian tubes. Arch. Path. & Lab. Med. **2:**161-205, 1926.
14. Johnson, W. O., and Miller, A. J.: Primary carcinoma of oviduct. Ann. Surg. **93:**1208-1214, 1931.
15. Norris, C. C.: discussion of McGlinn and Harer.[23]
16. Ewing, J.: *Neoplastic Diseases: A treatise on tumors.* Third edition. Philadelphia and London: W. B. Saunders Co., 1928. P. 653.
17. Spencer, H. R.: Three cases of primary cancer of the fallopian tube. J. Obst. & Gynaec. Brit. Emp. **17:**30-35, 1910.
18. Charache, H.: Primary carcinoma of fallopian tubes: report of two cases. Ann. Surg. **103:**290-296, 1936.
19. Scott, E., and Oliver, M. G.: Primary carcinoma of fallopian tubes. J. Lab. & Clin. Med. **14:**429-432, 1929.
20. Hurdon, E.: A case of primary adeno-carcinoma of the fallopian tube. Bull. Johns Hopkins Hosp. **12:**315-317, 1901.
21. Cullen, T. S.: Carcinoma of the right fallopian tube readily palpable through the abdomen. Bull. Johns Hopkins Hosp. **22:**20, 1911.
22. Callahan, W. P.; Schiltz, F. H., and Hellwig, A. C.: Primary carcinoma of fallopian tubes associated with tuberculosis. Surg. Gynec. & Obst. **48:**14-22, 1929.
23. McGlinn, J. A., and Harer, W. B.: Primary carcinoma of the oviduct. Surg. Gynec. & Obst. **26:**354-360, 1933.
24. Friedenheim, B.: Bietrag zur Lehre vom Tubencarcinom: über ein primäres, rein alveoläres Carcinom der Tubenwand. Berl. klin. Wchnschr. **36:**542-546, 1899.
25. Haupt, W.: Langjährige Heilung eines primären Tubenkarzinoms. Zentralbl. f. Gynäk. **57:**742-745, 1933.
26. Fonyó, J.: Über das primäre Tubenkarzinom. Zentralbl. f. Gynäk. **37:**1317-1329, 1913.
27. Zweifel: Berichte aus gynäkol. Gesellschaften u. Krankenhäusern. Zentralbl. f. Gynäk. **18:**661, 1894.
28. Jahkola, A.: Beiträge zur Kasuistik des primären Tubenkarzinoms: drei neue Fälle, davon zwei mit dauernder Heilung. Acta Soc. med. fenn. duodecim. **16:**1-27, 1931.
29. Benthin, W.: Beitrag zur Kenntniss des primären Tubencarcinoms. Arch. f. Gynaek. **87:**220-231, 1908.
30. Kaplan, I. I.: discussion of Smith, W. S.: Primary carcinoma of the oviduct: with a report of two cases. Am. J. Obst. & Gynec. **24:**267-270, 1932.

CASE REPORTS

CASE 1. L. C., a 40-year-old sterile and widowed woman, entered the Pondville Hospital on December 7, 1932, complaining of intermenstrual spotting of sufficient amount to require a pad for the previous year. The menarche began at 14 years, with a regular flow every 28 days and 2 days of bleeding until 4 years previously. Since then the flow had been more profuse over a 4-day interval. Scant vaginal discharge had been present for 1 year. There was a past history of neck dissection for lymphadenitis 27 years previously. Seventeen years before entry lymph nodes had been dissected from the opposite axilla. Three years previously masses of nodes were observed after trauma to the right groin. X-ray treatment was given to a carcinoma of the face arising in an old area of lupus vulgaris 1 year before. There was no history of chronic cough or hemoptysis.

On physical examination the scars of the previous operations were not remarkable. There was a hard 4-by-3-cm. mass fixed in the right inguinal region. Pelvic and rectal examinations confirmed the presence of a large retroverted uterus with a long, hard cervix. Blood was seen coming from the external os.

At operation, in addition to a large, freely movable uterus, a cystic mass filled the right broad ligament. This was more readily felt after drainage of 120 cc. of thin watery fluid from the uterine cavity. The curettings were negative. It was believed that the patient had pelvic inflammation with hydrosalpinx.

Two months later the patient was readmitted because of continued vaginal bleeding for 6 weeks. The pelvic mass on the right was more consistently felt and was believed to be a pelvic abscess. Cystoscopy ruled out the bladder as the source of bleeding. Operation was again performed. Curettage failed to produce any tissue, but the uterine cavity contained bloody fluid. Abdominal exploration showed a large uterus in fair position, with the right tube and ovary involved in a mass similar to a hydrosalpinx. Growth was present outside the right broad ligament and throughout the cul-de-sac. The left tube showed a hydrosalpinx, "without tumor." It was impossible to do a hysterectomy without leaving tumor, consequently the uterus was left as a vehicle for radium application, and 3000 mg. hr. of radiation was given 10 days later. At the time of the operation the groin was biopsied.

Microscopic pathological study showed sections composed entirely of tumor cells of epithelioid type, arranged in acinar formation along strands of connective-tissue stroma. There were numerous typical and atypical mitotic figures. The tumor cells were of the low columnar epithelial type. A diagnosis was made of papillary adenocarcinoma of the fallopian tube, with metastasis to the right groin.

Two months later 7200 mg. hr. of deep x-ray therapy was given through anterior and posterior portals. The patient died 2½ years later (July, 1935) with extensive neoplastic disease.

Case 2. A. P., a 43-year-old married but sterile woman, entered the Massachusetts General Hospital on September 14, 1933, with a history of intermittent soreness through the lower abdomen of 2 years' duration. Three attacks of severe intermittent lower abdominal ache had been noted in the past 6 months. In recent months a large, hard swelling had been noted in the lower abdomen. Fever, nausea and vomiting accompanied the attacks of pain. Ice bags were applied for what was believed to be "abscess of the womb." Six months previously vaginal discharge had been first noted. In the past few months the discharge had become black, requiring six pads a day. In the past 2 months abdominal distention with pain became a prominent symptom and was accompanied by anorexia. There had been no weight loss. The menstrual history for 3 years suggested the type of bleeding found in metropathia hemorrhagica.

At operation large bilateral tubo-ovarian masses were encountered. On the left side a tubo-ovarian abscess had twisted itself with a complete turn. The uterus was enlarged, with fibroids wedged in the pelvis. The lesion suggested a bilateral hydrosalpinx.

The pathological report revealed a papillary adenocarcinoma of the left tube together with acute and chronic salpingitis. Intramural fibroids were present. The left ovary, 4 by 3 by 1 cm., was adherent to the wall of a thickened distended tube. The tube was retort shaped. The cystic portion to which the ovary was attached measured 15 by 7 by 6 cm. Within the tube there were two areas of soft friable papillary growth, each 2 cm. in diameter. The other tube in its gross appearance suggested a hydrosalpinx containing a brownish fluid. Microscopic sections of the left tube showed papillary structure, with a moderate number of mitotic figures.

Subsequently, the patient received 5400 mg. hr. of deep x-ray therapy through 20-by-20-cm. fields, using anterior, posterior and pelvic portals. Three years later, in December, 1936, a fixed mass was felt in the right pelvis. A further dose of 3600 mg. hr. was given, using anterior and posterior fields. The patient succumbed with metastatic disease in November, 1937.

Case 3. M. M., a 53-year-old single woman, entered the Massachusetts General Hospital on February 23, 1934, with a history of sudden onset of vaginal bleeding 6 months previously. Usually one pad a day was sufficient to care for the discharge, but within the past 2 weeks it had become watery and more profuse with a foul odor. The menopause had occurred without incident 3 years before.

On physical examination a mass was found rising out of the pelvis to the level of the umbilicus largely on the right. It seemed to be adherent to the anterior abdominal wall. The cervix was of normal consistence but pulled to the left.

At operation the uterus was slightly larger and more irregular than normal. The right ovary was cystic and about the size of a small egg. In the broad ligament an irregular cystic mass was very adherent to the uterus and left tube. It was very hard in places. The left ovary lay behind and was atrophic. X-ray treatment was advised but not carried out. A total hysterectomy with bilateral salpingo-oophorectomy was done.

The pathologist reported a primary adenocarcinoma of the fallopian tube, with an unclassified cyst of the ovary.

The patient was well for 20 months. She then noted an increasingly large abdominal tumor with severe stabbing pain. There had been no vaginal discharge. In December, 1935, she was re-explored. Moderate ascites was present, together with a peritoneum studded with nodules and a mass in the omentum. The biopsy report was metastatic carcinoma. X-ray therapy was given. She gradually declined in weight and strength and died August 7, 1936.

Case 4. I. M., a 57-year-old married woman with one child, entered the Massachusetts General Hospital on October 18, 1934, with a history of intermittent bleeding of 6 months' duration. The onset of menorrhagia had been sudden, for the menopause had occurred 4 years before. At times only staining was noted. For the past 7 years there had been a sense of bearing-down pelvic pressure, with associated backache and frequency of urination. These symptoms had recently become aggravated.

On physical examination a fixed tender pelvic tumor was noted suprapubically to the right. The findings were interpreted as an impacted fibroid with a question of malignancy of the fundus.

At operation a total hysterectomy with bilateral salpingo-oophorectomy was done.

On pathological examination the endometrium was negative. A tube was closely adherent to an irregular knobby mass, 12 by 9 by 8 cm. One portion of the tube was thickened to 2 cm. Individual knobs of the mass measured 1.7 cm. in diameter. The sections revealed a rapidly growing, highly malignant carcinoma, primary in the tube and involving the ovaries; there was an associated acute and chronic salpingitis.

The patient returned to Nova Scotia, and it has been impossible to trace her.

Case 5. S. P., a 72-year-old single woman, entered the Massachusetts General Hospital on February 25, 1937, with a history of vaginal bleeding of 6 months' duration. The menopause had passed without incident at the age of 50. There had been no history of vaginal discharge or bleeding since that time until the onset of the present illness.

On physical examination a small retroverted uterus was felt on pelvic examination. Three small nodules were felt on the rectum, lying posteriorly behind the cervix. Nothing further was added to the findings on physical examination at the time of the curettage. The pathological report on curettings disclosed an inactive endometrium.

Discharged from the hospital, the patient was readmitted 2 months later with a history of daily bleeding since the curettage. The flow was at times copious, dwindling down to a pink stain. The curettings were scanty in amount. Inasmuch as the source of bleeding had not been explained a laparotomy was performed. A mass involving the right ovary and tube appeared as an irregular nodular growth. Difficulty was encountered in separating the growth from the rectum, and it was believed that possibly some diseased tissue still remained in this region.

Pathological examination revealed a very thin endometrium. A large intramural mass was present in the uterus, measuring 5 by 3 by 3 cm. and merging into the distal half of the right tube. The latter curled back on the posterior wall of the uterus, forming a semilunar mass to enclose a normal, atrophied ovary. The tube was filled with papillary tissue. The fimbriated end of the tube was obliterated while the proximal end was patent. The microscopic diagnosis was primary papillary adenocarcinoma of the fallopian tube.

The patient was last seen on June 1, 1939; there was active recurrence of the disease, and a terminal issue anticipated within a short time.

Case 6. G. M., a 59-year-old married but sterile woman, entered the Massachusetts General Hospital on July 18, 1937, with a history of lower abdominal pain associated with increasing abdominal swelling over the previous year. A sense of pressure in the pelvis had contributed toward increased frequency of urination. The menopause had occurred 17 years before, but no bleeding had been noted since.

On physical examination, though no mass could be outlined, a definite tenderness to palpation was observed in the left lower quadrant of the abdomen. A barium enema showed the sigmoid displaced to the right. A dense soft-tissue shadow could be seen on the left, although no definite tumor could be demonstrated. The diagnosis was made of disease on the left side of the pelvis, extrinsic to the bowel.

At operation a cystic tumor was found filling the pelvis and believed to be a large hydrosalpinx. The uterus was thumb size. A left salpingo-oophorectomy alone was done.

At pathological examination a tube 13.5 cm. in length, with the proximal portion swollen and thickened so that it was 2 cm. in circumference, was noted. The distal part was dilated to form a cyst which measured 7 cm. in diameter; this was adherent to the ovary. The lumen of the tube was dilated and filled with cloudy fluid. Sections showed numerous mitotic figures, and the diagnosis was adenocarcinoma of the fallopian tube. There was no invasion of the wall.

While the patient did not appear for examination, she reported on July 1, 1939, that she was active and well and had never felt better.

Case 7. L. J. J., a 54-year-old married woman with three chidren, entered the Pondville Hospital on November 11, 1938, with a history of vaginal bleeding for 3 days on one occasion 1 year before but without show of blood since that time. The menopause had occurred 3 years previously. While confined to the hospital with a broken leg, a tumor mass was found in the right lower quadrant. There had been an increased growth in the size of the tumor in the past 6 months. Actually she had gained weight. There was no history of vaginal discharge.

On examination she was an obese woman presenting a hard mass, with areas which seemed to be cystic, in the right lower quadrant. The mass was freely movable. The atrophied uterus had a small cervix which seemed to be pulled upward.

At operation negative curettings were obtained. A large mass was fixed posteriorly, with the small bowel, omentum and sigmoid adherent to it. This was believed to be a solid but partially cystic carcinoma of the ovary with definite inflammatory changes. Rotation in the cyst had taken place, and the mass was adherent deep in the pelvis. The wall of the uterus was invaded. The mesentery of the sigmoid was torn in the course of a total hysterectomy with bilateral salpingo-oophorectomy.

Pathological examination disclosed a negative endometrium. On the left side of the uterus was a nodular mass which was solid except for the cystic distal portion. The fimbriated end of the tube was sealed off. Behind the uterus was the right ovary. Both ovaries appear normal microscopically. A diagnosis of carcinoma simplex of the right tube was made, with five to eight mitotic figures noted per high-power field.

The patient reported to the clinic on April 25, 1939. Examination at that time failed to show any evidence of recurrence of the disease. She had gained weight and looked and felt well.

Case 8. M.G., a 58-year-old single woman, entered the Vincent Memorial Hospital on November 16, 1938, with a history of vaginal bleeding. The menopause had occurred 5 years before. Many years before, the right tube and ovary had been removed for pelvic inflammatory disease. Curettage 5 months previously failed to explain the source of postmenopausal bleeding. The patient was advised to have a hysterectomy, but refused. The bleeding had continued in varying amounts since that time. In the past 2 weeks she had had chills, fever and local tenderness throughout the lower abdomen, with a vaginal discharge of pure, saffron pus since that time, but no blood. For 2 weeks a tender mass had been palpable in the left lower abdomen. There were no urinary or bowel symptoms. There was no change in weight.

On physical examination, tenderness and spasm overlay a large suprapubic mass occupying the left lower quadrant. By pelvic examination this mass felt soft and cystic with nodular portions. This was thought to be continuous with the uterus and to represent a pyometra or an inflammatory ovarian cyst, with torsion of the pedicle or possibly a flare-up of an old pelvic inflammation. The temperature was 100.5°F., with a white-cell count of 18,000. The patient was obese. Because of experience with a similar case 1 week previously a preoperative diagnosis of carcinoma of the fallopian tube was made.

At operation, negative curettings were obtained. A huge inflammatory mass arose from the left adnexa; it extended behind the uterus and was fixed in the cul-de-sac on the right side. A large hydrosalpinx firmly enclosed what appeared to be an inflammatory cyst of the ovary. The tube was elongated, and the proximal part was stiff and hard. The right tube was missing. The right ovary was negative. No line of cleavage could be obtained, and the cyst was ruptured in delivering it. Because of the patient's condition, the plan to perform a total hysterectomy, with the removal of both tubes and ovaries, was abandoned in favor of a supravaginal hysterectomy including the adnexa.

On pathological examination the right tube measured 25 cm. in length and 2 cm. in diameter. The wall was thickened for its entire length, and the distal third was firmer and more distended than the proximal two thirds. On section the lumen was filled with soft, white tumor tissue, which was invading the wall. The end was adherent to the ovary, which had been previously opened, was markedly injected and measured 6 cm. in diameter. On section it contained a cyst measuring 5 cm. in diameter; this was lined with smooth, glistening membrane on one side, but on the side adjacent to the tube there was soft, white tumor tissue. It could not be determined whether there was involvement of the ovary with tumor. Most of the ovarian tissue showed acute and chronic inflammation.

The patient immediately before leaving the hospital was given 7200 mg. hr. of deep x-ray therapy with a 400,000-volt machine, through anterior and posterior fields. When last seen she was well, with no evidence of recurrence of disease.

THE EVOLUTION OF THE TREATMENT OF PULMONARY TUBERCULOSIS AT THE RUTLAND STATE SANATORIUM

PAUL DUFAULT, M.D.*

RUTLAND, MASSACHUSETTS

THE trend of active treatment of pulmonary tuberculosis at the Rutland State Sanatorium during the last decade, with the rise of various surgical procedures followed by the fall of some of them, is conducive to much sober thought. It shows once more that the path of medical progress is one of byways, detours and circles. Besides, to study old records is to submerge one's soul in a pool of humility, and I know of no more salutary practice.

From January, 1927, to January, 1939, 4161 patients were admitted to the Rutland State Sanatorium and classified as follows: minimal, 468; moderately advanced, 1500; far advanced, 1952; childhood type and non-tuberculous, 239 (Chart 1). Let us consider the main surgical procedures as applied to this group.

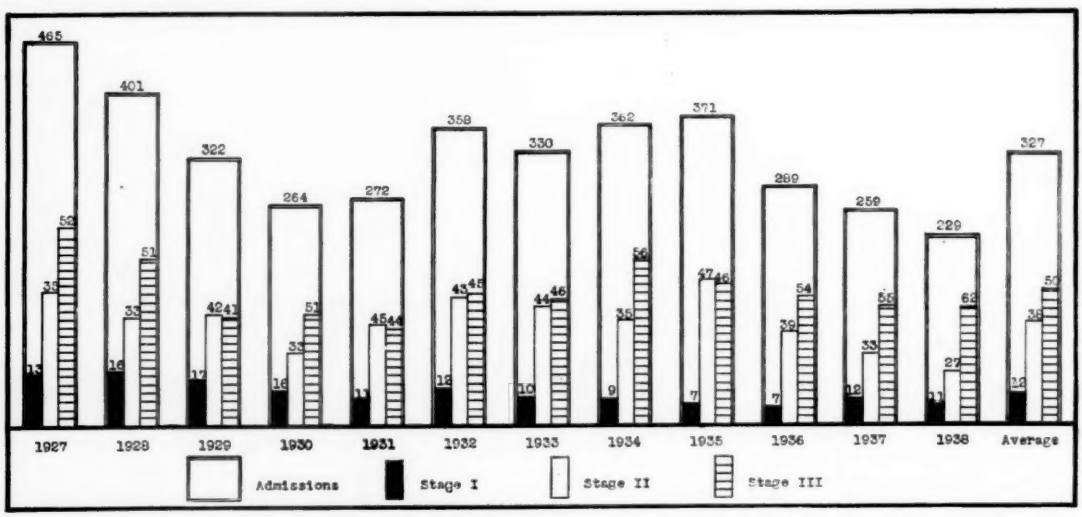

CHART 1. *Annual Admissions from 1927 to 1938, Inclusive, with Percentages Giving the Stages of Disease.*

The figures on top of the large columns are the actual number of admissions. Those over the smaller columns represent the stages in percentages. These figures and percentages are exclusive of the "not considered," "hilum" and "non-tuberculous" groups.

ARTIFICIAL PNEUMOTHORAX

Artificial pneumothorax was done in Rutland as early as 1911, and 74 patients had already received it by 1914, at which time it was found wanting and discarded. By 1919, it had been given another trial, and Alley[1] concluded the report of a study on 21 cases with a more optimistic note. Yet for the next six years only a few cases can be found in the records.

The treatment was carried on in an unscientific and haphazard way because of the lack of experience and of fluoroscopic and x-ray control. It is only since 1927 or 1928 that the application of this treatment has become systematic. Timidly, one step at a time, we have found our way to the practice of today. Points which are now obvious were the subjects of contested opinions a little while ago. The medical journals of yesterday are witnesses to this fact in any branch of medicine. Compare the technic of 1938 to that of 1918 or even that of 1928. The large initial doses, the long intervals between refills, the withdrawals in the presence of effusions, the maintenance of ineffective and dangerous collapses appear obviously improper compared to the present well-gauged and well-timed refills under constant fluoroscopic guidance, to the management of effusions by aspirations, replacement of air and lavage when needed, the resection of adhesions, and so forth. Formerly, ineffective collapses were often maintained for the simple reason that nothing better could be offered and that they made the doctor, if not the patient, feel better and less conscious of his uselessness.

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Today, pneumothorax is made to work or is discarded as useless.

Then came the question of voluntary re-expansion, which had not arisen before on account of the naturally short life of 95 per cent of the pneumothorax cases. It is now being answered more precisely every day. A minimum of two or three years for exudative lesions and of five years

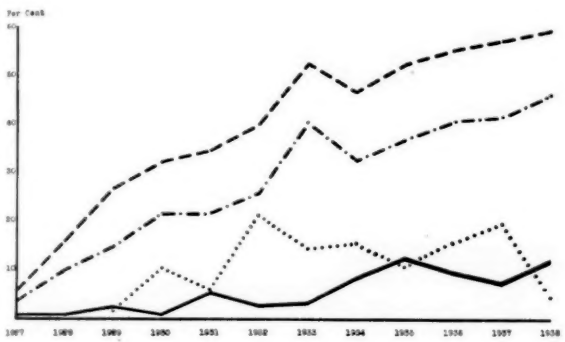

CHART 2. *Trends of Active Treatment from 1927 to 1938, Inclusive, Expressed as Percentages of Total Admissions.*

The dash curve represents the total pneumothoraces; the dash-and-dot curve, the successful pneumothoraces; the solid curve, the thoracoplasties; and the dot curve, the phrenectomies.

for ulcerative, excavating processes has been generally accepted.

The follow-up of patients over a number of years during and after completion of their treatment has taught us much about the handling of individual cases, and the value of the methods properly and improperly applied. Serial films of re-expanded lungs taken year after year have been precious lessons as to the fickleness and trickiness of apparently absorbed or healed lesions.

Artificial pneumothorax has survived ignorance, mismanagement and errors of technic. Its use, limited at first to the strictly unilateral and moderately advanced cases, has been extended both ways: to the minimal and to the far-advanced cases. So long as there is a ray of hope, the treatment is tried with about 60 per cent of the patients. The only ones with whom it is not attempted are a few asymptomatic minimal cases, a certain group of chronic productive cases and the hopeless ones.

The large percentage of suitable cases in which pneumothorax is impossible (Table 1) contributes to an increase in the number of thoracoplasties. Numerous statistics have been published in the past showing gratifying results, but surveys of the next few years should reveal the much greater effectiveness of this form of treatment as carried out at present. A comparative study of this kind is now under progress in this sanatorium.

PHRENIC SURGERY

Time and again, eight or nine years ago, we found ourselves confronted with good bases which had been permanently, and too often uselessly, sacrificed by phrenic exeresis because of damaged upper lobes in need of thoracoplasty — evidently poor judgment in the choice of the procedure, one might say. Yet numerous were such cases only yesterday. Even the best judgment, based on the condition of the lungs at the time of operation, is unable to foresee the problem that six months' or a year's time will bring up. Every so often one of those "permanents" comes to us with a mediastinum out of kilter, carrying a distended stomach in his axilla and complaining of various digestive disorders, usually not fatal but extremely annoying. Hence, the procedure has practically been abandoned (Table 2).

Phrenic interruption has been found inefficient for closing hard-walled cavities. It may favor absorption of early infiltrative processes. It is still occasionally used as a step and a preparation to thoracoplasty after failure of pneumothorax. But even here one has to be cautious. The phrenic nerve is sensitive and prone not to resume all its function. A recent survey of our temporarily paralyzed diaphragms revealed that after six, seven

TABLE 1. *Pneumothoraces.*

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	TOTALS
Pneumothoraces													
Unsuccessful	10	24	37	28	35	50	41	51	58	43	41	31	449
Successful	17	40	49	57	59	93	133	119	137	118	108	106	1036
Total	27	64	86	85	94	143	174	170	195	161	149	137	1485
Successful (per cent)	63.0	62.5	57.0	67.1	60.6	65.0	76.4	70.0	70.3	73.3	72.5	77.3	69.9
Admissions	465	401	322	264	272	358	330	362	371	289	259	229	3922
Pneumothoraces													
Unsuccessful (per cent)	2.1	6.0	11.5	10.6	12.9	14.0	12.4	14.1	15.7	14.9	15.8	13.5	11.5
Successful (per cent)	3.7	10.0	15.2	21.6	21.7	26.0	40.3	32.9	36.9	40.8	41.7	46.3	26.4
Total (per cent)	5.8	16.0	26.7	32.2	34.6	40.0	52.7	47.0	52.6	55.7	57.5	59.8	37.9

The increase in recent years in the percentage of successful pneumothoraces is partly due to the fact that the method is applied earlier, before adhesions have formed. Before 1930, pneumothorax was recommended for advanced cases only.

and eight months 30 per cent had recovered only half their motion, and that 70 per cent were functioning normally, but still remained high. These figures are about the same in other sanatoriums.

Some surgeons are now doing only one crush in order to avoid this permanent partial paralysis. They prefer repeating the operation if necessary.

INTRAPLEURAL PNEUMOLYSIS

The x-ray films of pneumothorax cases before the era of intrapleural resection of adhesions constitute a gallery of distorted lobes, suspended cavities and irregular, ill-distributed, paradoxically selective collapses. From 55 to 65 per cent of the pneumothoraces, incomplete on account of adhesions, are amenable to the Jacobeus operation. The percentage of successful pneumothoraces is increased to that extent (Table 3).

An excessive number of complications occurred during the first three years, especially bleeding and perforations, with subsequent mixed empyema, tuberculous empyema and loss of collapse. For the last three years a more judicious choice, coupled with a better technic, has practically eliminated all complications.

OLEOTHORAX

Oleothorax was used at the beginning in order to disinfect the pleural cavity in tuberculous empyema, to close rigid-walled cavities, to prevent obliteration and to replace air when, because of distance from the sanatorium, refills became difficult or too expensive. The last indication does not exist in Massachusetts. The hard-walled cavities are falling more and more into the realm of thoracoplasty, and tuberculous empyemas respond fairly well, as a rule, to aspiration and to lavage with mild disinfectant or saline solution. However, progressive obliteration is still fought with some success by this method.

EXTRAPLEURAL PNEUMOTHORAX

Until a year ago, there were in sanatoriums an unfortunately large number of patients stranded in a no man's land between pneumothorax and thoracoplasty. It is in this field that extrapleural pneumothorax has ventured and been found useful. Indications for this operation do not overlap those for any of the others; rather they span the gap between them, thus increasing the number amenable to surgical treatment. Therefore, in estimating its value one must not forget the type of patients treated and expect too brilliant results. Considering that most of these patients were beyond help and had been virtually abandoned, one should be satisfied with a smaller degree of success than in thoracoplasty.

TABLE 2. *Phrenic Surgery.*

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	TOTALS
Admissions	322	264	272	358	330	362	371	289	259	229	3056
Phrenics:											
Permanent	5	28	19	73	40	42	3	2			212
Temporary				3	9	14	38	44	50	11	169
Total	5	28	19	76	49	56	41	46	50	11	381
Permanent (per cent)	1.6	10.6	6.9	20.4	12.1	11.6	0.8	0.7			6.9
Temporary (per cent)				0.8	2.7	3.9	10.2	15.2	19.3	4.8	5.5
Total (per cent)	1.6	10.6	6.9	21.2	14.8	15.5	11.0	15.9	19.3	4.8	12.5

TABLE 3. *Pneumolyses.*

	1932	1933	1934	1935	1936	1937	1938	TOTALS
Successful pneumothoraces	93	133	119	137	118	108	106	814
Pneumolyses:								
Number	15	75	63	23	43	70	40	329
Per cent	16.1	56.4	53.0	16.8	36.5	64.8	37.7	40.4

THORACOPLASTY

With thoracoplasty we have proceeded very much in the same manner as with pneumothorax, namely cautiously, with fear and trembling (Table 4). There were only 2 cases in the first year (1927) and 2 in the second; yet we had some 365 patients to choose from. Three of these 4 patients are well and working today. One had to re-enter a sanatorium for treatment.

The following year (1929) 7 patients received thoracoplasty and 2 died, a severe disappointment. Up to that time the selection had been most conservative. The first 9 cases were of long standing; the patients were in excellent general condition, and in each the other lung was perfectly clear. The tenth patient was the first one accepted with some old lesions in the "good lung." His condition was far advanced; there was a large cavity on the left, and the general condition was only fair. He began to run an active course after the first stage and died six months later of generalized tuberculosis. In the other fatal case the patient succumbed to tuberculous pneumonia eight days after the second stage of thoracoplasty.

In 1930 there was a slump; only 2 thoracoplasties were performed. The number rose to 15 in 1931 and from then on it was fairly sustained. The requirements for this operation were lowered, and the films rarely showed an entirely clear contralateral lung in the cases done from the fourth year on.

A period of observation is always required of the candidate for thoracoplasty during which he must show good resistance to his disease, for at best surgery can only assist the patient in healing his lesions. This period is also one of rest treatment, which is the necessary foundation of thoracoplasty. The time given to bed treatment is seldom less than a year, unless the patient is a readmission or has an old record from another institution.

Only 28 patients, or 16 per cent of the total series, were operated on as early as three months after their admission, and 33 six months after admission. Fifteen of these 61 patients were readmissions and had had previous treatment. Twenty-one thoracoplasties were done after nine months of treatment, 55 after one year and 20 after two years. The 17 others were done after three to five years of treatment.

As happened with pneumothorax, stable old lesions in the good lung ceased to inspire fear. A close and detailed study of the blood* has greatly helped us to choose our cases during the past five years. This selection of cases is an important factor in the results obtained. Unless a patient has a 90 per cent chance of becoming self-supporting, he should not be submitted to surgery. Patients who can expect no more than chronic invalidism may as well be spared the ordeal.

The period of convalescence varies between five months and a year — preferably the latter — and is a repetition of the first cure. Patients are rarely allowed up before five or six months after operation. We like to start them on exercise and light work before discharge.

Most of those who have left in good condition have remained so. For this there are several reasons. A thoracoplasty is an impressive warning which patients are not likely to forget. Knowing that they must live with one lung, they gauge their speed accordingly, and adjust themselves to their condition better than any other type of patient. They are also faithful in reporting for periodical check-ups, and will not consider any type of work without the approval of their physicians.

The great problem after discharge is that of finding suitable occupation. This is true of all "cured" tuberculosis cases, but especially of this select group. Professionally trained persons, students, office workers and a certain percentage of skilled laborers can return to their former occupations, but most of the factory workers and all the unskilled laborers must find new work. To go back to laborious work is to take the shortest road to a breakdown. This is one of the most difficult tasks of the Social Service Department.

*Conducted by Dr. Gulli Lindh Muller.

TABLE 4. *Thoracoplasties.*

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	TOTALS
Admissions	465	401	322	264	272	358	330	362	371	289	259	229	3922
Thoracoplasties													
Number	2	2	7	2	15	9	11	31	49	27	20	28	203
Per cent.....	0.4	0.5	2.2	0.8	5.5	2.5	3.4	8.8	13.0	9.3	7.7	12.2	5.2

DISCUSSION

The increasing number of pneumothoraces and thoracoplasties lengthened the average duration of residence per patient from 362 days in 1932 to 459 days in 1938. Table 5 shows the rate at which the number of patients receiving some form of collapse therapy were accumulating.

Phrenic exeresis, used as an independent procedure at the beginning, soon passed into the category of adjuncts, to be almost discarded in late years. From a peak of 73 in 1932 the phrenicectomies fell to 2 in 1936 and to 0 in 1937. At the present time, Dr. Joseph Alexander[2] does only 5 exereses against 95 interruptions.

The number of phrenic interruptions has also decreased. Our figures for the last four years are 38, 44, 50 and 11. The tendency appears to be the same almost everywhere.

Intrapleural pneumolysis seems to be the greatest step toward efficient collapse therapy taken in the past decade. It is only since 1932 that it has been done regularly in this sanatorium, with 15 operations for that year. Since then it has ranged between 40 and 70 cases per year.

Oleothorax, although not discarded, is not being used so frequently as it was a few years ago.

Extrapleural pneumothorax is not a procedure to be considered lightly, but it offers definite hope to otherwise hopeless cases. To the end of 1938, 11 cases were done, with the following results:

good 7; no improvement 3; bad 1 (bronchial fistula).

Thoracoplasty was done on 5 per cent of the total number of patients admitted during the last twelve years, and on 12 per cent of those admitted during the last five years. The latter figure represents better practice than that for the first period, when too few were accepted for the operation. The results for the last eleven years in 175 cases are as follows (the 1938 cases are not included): well, 103 cases (59.0 per cent); under treatment, 44 (25.0 per cent); unknown, 11 (6.3 per cent); postoperative deaths, 9 (5.1 per cent); and later deaths, 8 (4.6 per cent).

TABLE 5. *Summary of Active Treatment.*

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	TOTALS
Admissions	488	415	333	277	289	393	357	395	398	298	272	246	4161
Stage I	62	66	55	42	31	44	34	31	26	21	31	25	468
Stage II	162	131	136	88	122	155	144	128	175	113	85	61	1500
Stage III	241	204	131	134	119	159	152	203	170	155	143	143	1954
Not considered, hilum and non-tuberculous	23	14	11	13	17	35	27	33	27	9	13	17	239
Pneumothoraces:													
Unsuccessful	10	24	37	28	35	50	41	51	58	43	41	31	449
Successful	17	40	49	57	59	93	133	119	137	118	108	106	1036
Total	27	64	86	85	94	143	174	170	195	161	149	137	1485
Number of patients during year	30	84	117	138	178	194	251	333	300	252	275	296	2448
Phrenics:													
Permanent			5	28	19	73	40	42	3	2			212
Temporary						3	9	14	38	44	50	11	169
Total			5	28	19	76	49	56	41	46	50	11	381
Pneumolyses						15	75	63	23	43	70	40	329
Oleothoraces					1	8	10	10	6		3	1	39
Thoracoplasties	2	2	7	2	15	9	11	31	49	27	20	28	203
Extrapleural pneumothoraces												18	18

Let us study the failures first. Nine patients died within a month after operation: 5 of tuberculous pneumonia, 1 of collapse of the lung and effusion on the thoracoplasty side, 1 of sudden and unexplained collapse the fifth day after operation and 2 of empyema. Eight died of progressive tuberculosis between six months and two years after operation. Another, not included in the percentage figures, died four years after thoracoplasty, following a gall-bladder operation.

Sixty patients whose sputums remained positive after operation may be classified as follows: progressive tuberculosis, 29 cases; lesions on opposite side, 15; bronchial ulceration, 1; and cavity not closed, 15. Thirty-five of these patients are well today and able to lead fairly normal lives. In some cases the sputum later turned negative.

A look at the brighter side of the picture shows that after a little more than eleven years 147 of these 175 patients are alive; that is, 103 are well and leading normal lives, while 44 are completing their cures and will for the most part soon be normal and self-supporting. Remembering that 90 per cent of the cases with demonstrable cavities die within five years, these results are gratifying. One hundred and forty-five of the patients had demonstrable cavities by x-ray.

Pneumothorax covers a wider field, the average percentage of patients on whom it was tried being 55 per cent for the past five years. In a recent article Overholt[3] comments on the results of thoracoplasty in comparison to those of pneumothorax. There is no sound basis for a comparison of this kind because the two procedures reach different groups of patients. Thoracoplasty, is or at least should be, reserved for a relatively small number of patients who have already mastered their infections and need only mechanical help. Pneumothorax is applicable to all stages, from the minimal to the far advanced, and to those with active processes, some of which will continue regardless of what is done. Pneumothorax is bound to have a larger proportion of failures than does thoracoplasty. Overholt's comparison is between thoracoplasty and sanatorium treatment in a "pneumothorax era." It is based on a survey[4] made in 1931 of 208 patients treated in 1925 and 1926 at the Rutland State Sanatorium. Our figures show that pneumothorax was attempted in only 50 cases during that period. Of these, 2 were lung abscesses, 20 were unsuccessful, 17 were collapsed less than a year and 11 were collapsed one year or more. This therapy would not have influenced to a marked degree the ultimate fate of these 208 patients, especially if one recalls the type of pneumothorax common in those days.

CONCLUSIONS

Sanatorium treatment has been prolonged instead of shortened by various surgical measures.

The results of pneumothorax and thoracoplasty are gratifying. The other minor procedures being used mostly as adjuncts, the good they accomplish is more difficult to appraise. They do help in many cases and this is sufficient recommendation for them. The best of these procedures are pneumolysis and extrapleural pneumothorax. Our experience, however, in the latter, is still limited.

Pulmonary tuberculosis remains essentially a medical problem. The patient is still the great artisan of his own cure, and must control his disease before the surgeon can help him. Active treatment in all its forms rests on a mechanical basis.

When and if a serological or a chemical cure is finally discovered our present efforts will seem futile; yet until it is, the free pleura and the "good chronic" will remain the answer to the sanatorium physician's and the chest surgeon's prayers.

REFERENCES

1. Alley, L. A.: The value of artificial pneumothorax therapy as associate treatment of pulmonary tuberculosis. Boston M. & S. J. **180**:668, 1919.
2. Alexander, J.: personal communication.
3. Overholt, R. H.: Selective thoracoplasty with lung mobilization; conservative goal in permanent collapse therapy. Am. Rev. Tuberc. **37**:152-173, 1938.
4. Langmuir, A. D.; Williams, S. L., and Pope, A. S.: Certain factors influencing mortality of sanatorium-treated cases of pulmonary tuberculosis. New Eng. J. Med. **211**:26-29, 1934.

CALCULUS FORMATION IN A URETHRAL DIVERTICULUM IN A WOMAN*

Report of a Case

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DISEASES of the urethra are a frequently overlooked cause of urinary symptoms in women. In 234 consecutive female patients with urinary complaints Stevens[21] found the urethra to be wholly responsible for the symptoms in 56 cases and partially responsible in 173 cases. A diverticulum of the urethra was found in only 1 case.

A case of urethral diverticulum containing a large calculus has recently come to our attention and is reported herewith.

CASE REPORT

R. G., a 52-year-old, married, white woman, was admitted to the Framingham Union Hospital because of difficulty of urination of 12 years' duration. She stated that the first symptoms referable to the urinary tract occurred at the age of 24 when, following an upper respiratory infection, she suffered frequency and burning of urination for several days. Following this episode she continued to have similar attacks lasting several days to a week and occurring two or three times a year. Twelve years previously she suffered an acute urinary retention of 48 hours' duration. She did not seek medical attention at this time but, after trying various home remedies, discovered that pressure applied with the tip of the finger on the anterior vaginal wall just posterior to the external urethral orifice allowed the urine to pass. Since then this maneuver, applied in the squatting position, had been necessary each time during the act of micturition. Eight years previously the patient was studied at another clinic where a diagnosis of syphilis was made and treatment instituted; an x-ray of the abdomen was taken which showed "a stone in the bladder." The patient refused further investigation of her urinary tract. At the time of admission her only complaint was difficulty of initiating the act of urination. She had recently discovered that by lying prone over a bedpan she could void without pressure on the anterior vaginal wall.

The past history was significant in that at the age of 17 the patient had a miscarriage at 3 months which was self-induced with the aid of a hatpin. She had no urinary symptoms following this episode. A second and spontaneous miscarriage at about 3 months occurred at the age of 45. There had been no other pregnancies. She had received antisyphilitic treatment off and on for the past seven years. The patient's mother died of "bladder trouble." One sister died of tuberculosis. Otherwise the family history was noncontributory.

Physical examination revealed a well-developed and well-nourished woman who was co-operative and of average intelligence. The right pupil was larger than the left and reacted sluggishly to light. There was marked dental sepsis; otherwise the general and neurological examinations were negative.

Pelvic examination revealed no abnormalities except on the anterior vaginal wall just posterior to the external urethral meatus, where there was a mass approximately 2 cm. in diameter covered with normal vaginal mucosa. The mass was quite hard and appeared to be connected with the urethra. A catheter was easily passed into the bladder and there was no residual urine. On cystoscopic examination the bladder mucosa appeared to be normal throughout. Excretory urograms showed no abnormality of the upper urinary tract. The base of the dye-filled bladder appeared normal and the sphincters were competent. A cystogram made with the urethral catheter in place (Fig. 1) showed the presence of a large stone lying in the course of the urethra about 1.5 cm. from the base of the bladder. Lateral plates, made with the urethral catheter in place and with the vagina packed with gauze saturated with a suspension of barium sulfate, demonstrated that the stone lay in a sac in the urethrovaginal septum.

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Laboratory examination showed the urine to contain many polymorphonuclear leukocytes. Blood counts were within normal limits. Three blood Hinton tests were positive. The serum calcium was 9.3 mg. per 100 cc., the serum phosphorus 4.0 mg., and the phosphatase 5.7 Bodansky units. The blood nonprotein nitrogen was 28.0 mg. per 100 cc.

A preoperative diagnosis of calculus lying in a diverticulum of the urethra was made. Operation was performed January 3, 1939, under low spinal anesthesia. A transvere incision was made through the anterior vaginal wall over the prominence of the stone. The wall of the diverticulum was freed throughout its extent and was found to communicate with the lumen of the urethra through an ostium approximately 1 cm. in diameter. The sac, with the contained stone (Fig. 2), was amputated at its neck, and the defect in the urethra was closed with fine catgut sutures. The incision in the vaginal mucosa was closed with chromic catgut.

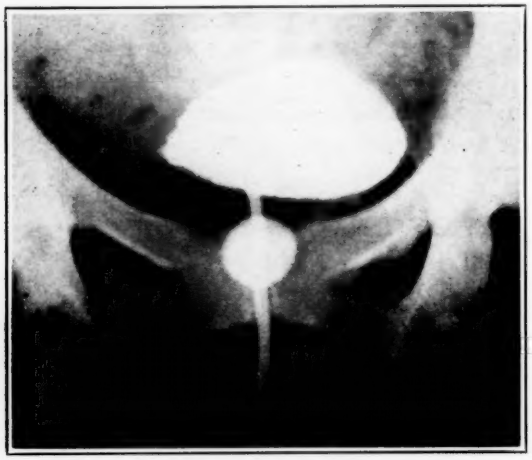

FIGURE 1. *Cystogram with Urethral Catheter in Place. There is a large calculus lying in the course of the urethra, well below the bladder.*

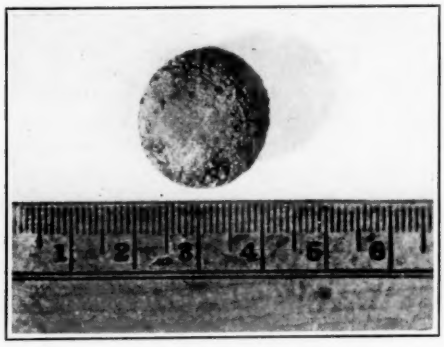

FIGURE 2. *Stone Removed from Urethral Diverticulum.*

Urethral catheter drainage of the bladder was maintained for 10 days after operation. Healing occurred by first intention and, following the removal of the catheter, the patient was able to void without delay or discomfort. Since then she has remained entirely symptom free, and recent urine examination showed no cells in the sediment.

INCIDENCE

Diverticulum of the female urethra has been reported in the surgical literature with increasing frequency during the last twenty years, and as such can no longer be considered a clinical rarity. Calculus formation in such a diverticulum is, however, decidedly rare. Shivers and Cooney[20] reviewed the literature up to 1931 and were able to find reports of only 22 cases. An additional case reported by them at that time brought the total to 23 cases.

In the present study, a careful search of the literature from 1931 to 1938, inclusive, has been made. A total of 10 cases has been found in the literature during that interval (Table 1). The new case presented in this report makes a grand total of 34 cases reported to date. This does not include cases reported by Begg,[1] Bibus[2] and others in which stones have descended from the upper urinary tract to become impacted in the normal female urethra. Two cases mentioned by Walters and Thiessen[23] were not included because sufficient details were not presented in their report.

TABLE 1. *Recently Reported Cases of Calculus Formation in Diverticula of the Female Urethra.*

AUTHOR	AGE OF PATIENT	DURATION OF SYMPTOMS	TREATMENT	RESULT
	yr.			
Earlam[4]	59		Removed vaginally	Cure
Holman[8]	27		Removed vaginally	Cure
Hunner[9]	77	37 yr. (mass present 3 yr.)	Removed vaginally	Cure
	52	5 mo.	Removed vaginally	Cure
	66	1 yr.	Removed vaginally	Cure
Lewis[12]	43		Removed vaginally	Cure
Marion[15]	75	4½ yr.	Removed transvesically	Cure
Podleschka[18]	33		Removed vaginally	Cure
Stevens[21]	50		Removed vaginally	Cure
Szenteh[22]	66	14 yr.	Removed vaginally	Cure

ETIOLOGY

The etiology of diverticulum of the female urethra has long been a matter of speculation and of disagreement. Watts,[24] in 1906, after a thorough review of the subject concluded that in men the etiology of urethral diverticulum could be classified as follows:

A. Congenital.

B. Acquired.
   1. From dilatation of the urethra:
      a. Due to urethral calculus.
      b. Due to urethral stricture.
   2. With perforation of urethra resulting from:
      a. Injuries to the urethra.
      b. Rupture of abscesses into the urethra.
      c. Rupture of cysts into the urethra.

Since then numerous authors have attempted to adapt diverticulum of the female urethra to this

classification. Various authors have stated that the congenital or "true" diverticulum is one whose wall contains all the elements of the wall of the normal urethra.[20] Others[4, 9] have suggested that a lining of normal urethral mucosa indicates a urethral diverticulum of congenital origin. In speaking of diverticulum of the bladder, Young[26] long ago pointed out that regardless of its origin, whether congenital or acquired, the wall of the bladder diverticulum might contain some or none of the elements that make up the normal bladder wall. Because diverticulum of the female urethra is in many respects comparable to diverticulum of the bladder, this observation tends to minimize the importance of the microscopic structure of the diverticulum as an aid in determining its etiology. The presence or absence of the lining mucous membrane is particularly unsatisfactory as a criterion of etiology because of the frequent presence of secondary infection, which so often destroys all evidence of lining mucosa.

Coupled with the above observations is the more pertinent fact that no case of urethral diverticulum has ever been reported in a girl infant. The closest approach to this situation was reported by Johnson,[11] who presented the case of a newborn girl whose urethra was obstructed by a cyst of the urethrovaginal septum. The cyst was removed through an incision in the vaginal mucosa. Johnson points out that had this congenital cyst ruptured into the urethra it would have resulted in a urethral diverticulum. It is evident that had this chain of events occurred, the result would not have been a congenital diverticulum but rather a congenital cyst forming a diverticulum.

Remnants of Gartner's ducts have been suggested as possible congenital causes of female urethral diverticulum.[11] This suggestion may be dismissed by the knowledge that these wolffian remnants lie far lateral to the urethra, and embryologically play no part in its formation.[19]

Many cases of congenital diverticulum of the male urethra have been reported. To be of congenital origin such a diverticulum must be in the pendulous urethra at or near the fossa navicularis.[12] Embryologically the entire female urethra is equivalent to only that part of the male urethra lying between the internal urethral orifice and the verumontanum. Hence, from a comparison of circumstances as they exist in men and in women, one is again forced to conclude that diverticulum of the female urethra does not occur as a congenital defect.

Since diverticula of the female urethra probably do not occur as congenital defects, they must necessarily all be acquired, probably as a result of trauma, infection or both. The most obvious trauma to the urethra is that sustained during parturition. The mechanism of this injury is probably twofold: first, compression of the urethra between the symphysis pubis and the fetal head during delivery, with injury to its supporting coats; and second, a general relaxation of the supporting ligaments of the internal genitalia with prolapse of bladder and urethra. Both these factors are probably responsible in a majority of cases. Since the external meatus is the smallest portion of the female urethra, a back pressure is produced within its lumen with each act of micturition. This back pressure probably distends the diverticulum and causes it to enlarge.

Instrumentation of the urethra may of course be responsible for an initial injury to its wall, with subsequent diverticulum formation. This factor was probably entirely responsible for the etiology of the diverticulum in Holman's[8] case, in which a bit of slippery elm was found to form the nucleus of a calculus that was present in the sac.

Periurethral abscess in women is unusual but may arise from infection of the urethral glands. Rupture of such an abscess cavity into the lumen of the urethra might be responsible for the development of a diverticulum in an occasional case. Similarly, intraurethral rupture of a cyst developing from the gradual dilatation of an obstructed urethral gland could be responsible. Herzenberg's[7] case of bilateral calculus formation in the distended lumina of Skene's glands in a child of eleven lends credence to the latter theory.

McNally[16, 17] has recently suggested that such diverticula may be the result of traction exerted during the resolution of a periurethritis, a mechanism similar to that producing traction diverticulum of the esophagus.

Since the lumen of a urethral diverticulum will allow for the stagnation of urine with subsequent infection, and with local changes secondary to the infection, the determination of the etiology is dependent on the symptoms at the onset of the disease. Because these symptoms usually occur many years before the patient consults a physician, the etiology in an individual case is usually a matter of speculation.

Stagnation of urine with secondary infection offers an ideal combination for the precipitation of urinary salts and formation of calculus. Periodic emptying of the diverticulum with coitus, changes of posture, and so forth, probably accounts for the rarity with which calculi are found.

Several of the reported cases with calculus formation have given a history of preceding renal colic. In an occasional case, a stone descending from the upper urinary tract becomes lodged in a preformed urethral diverticulum, where it grows

by accretion. Bibus[2] points out that in such cases multiple stones are often found, whereas if calculus formation occurs primarily within the diverticulum, a single stone is usually present.

CLINICAL FINDINGS

The symptoms of urethral diverticulum, with or without calculus formation, are those of lower urinary-tract infection usually present intermittently for months or years. These include urinary frequency and burning nocturia, pyuria and, rarely, hematuria which, when present, is usually of the terminal type. In the absence of calculus many patients discover that digital pressure on the anterior vaginal wall causes the evacuation of pus from the sac, with temporary improvement of the symptoms. Symptoms of urethral obstruction are rare whether calculi are present or not. However, in the case presented above the weight of a large calculus caused a kink of the urethra, which required digital pressure under the stone in order to allow urine to pass.

Local examination reveals a smooth, spherical swelling of the anterior vaginal wall just posterior to the external urethral meatus. This swelling is hard in the presence of calculus, and with multiple calculi, crepitus may be felt. Urethroscopy demonstrates the mouth of the diverticulum in the posterior wall of the urethra, usually in its middle third, while cystoscopy usually reveals a normal bladder.

The size and anatomical relation of a diverticulum without stone may be established by x-raying the diverticulum after it has been filled with a solution of sodium iodide or other radiopaque medium. After the diverticulum has been evacuated by digital pressure it may be easily filled with the radiopaque solution by filling the catheterized bladder with the solution and then having the patient void. In cases with calculus present, cystograms taken with the urethral catheter in place usually suffice to establish the diagnosis.

TREATMENT

The treatment of urethral diverticulum with or without stone is entirely surgical. The sac of the diverticulum is readily approached through an incision in the anterior vaginal wall. Resection of the sac with resuture of the urethra and vaginal wall has given universally satisfactory results. In all reported cases healing has occurred promptly, without sepsis or the formation of urethrovaginal fistulas. The functional results in each case have been excellent.

The operation should not, of course, be undertaken until blood and urine studies have demonstrated the absence of significant renal drainage. In an occasional case where such damage is of sufficient degree to increase the risk of operation, a preoperative period of urethral catheter drainage may properly be instituted until the renal function has returned to approximately normal. In rare cases it may be advisable to drain the bladder suprapubically before undertaking repair of the urethra, although only 1 such case has been reported.[20]

Simple removal of the calculus without removal of the diverticular sac has been mentioned. It is stated[2] that after this procedure the sac shrinks in size and causes no further symptoms. Such treatment is illogical, since the majority of urethral diverticula occur without stones and tend to enlarge gradually rather than shrink. Removal of the sac presents few difficulties and adds nothing to the seriousness of the operation, provided, of course, that the external sphincter of the bladder is carefully avoided.

Marion's[15] case presented a very large stone, weighing 35 gm. and lying in a diverticulum with a large opening into the urethra. Because of the size of the stone it was removed through a suprapubic incision. This is the only such case reported, although several cases are reported[1, 2] in which this route has been employed for the removal of stones impacted in the urethra but not lying in diverticula.

SUMMARY

Urethral diverticula in women are not uncommon, although calculus formation in such a diverticulum is decidedly rare.

Probably urethral diverticula in women are never congenital in origin but always acquired as a result of trauma or infection, or both, to, in or around the urethra.

Calculus formation in such a diverticulum is usually due to local urinary stasis with infection, which allows for the precipitation of urinary salts.

Treatment is surgical, and consists of removal of the diverticulum together with its contained stone.

The literature is reviewed and the thirty-fourth reported case of calculus formation in a urethral diverticulum in a woman is presented.

REFERENCES

1. Begg, R. C.: Urethral calculus in the female; case occurring in child of five years. Urol. & Cutan. Rev. **38**:50, 1934.
2. Bibus, B.: Zur Klinik der Harnröhrensteine beim Weibe. Ztschr. f. Urol. **31**:473-479, 1937.
3. Cone, R. E.: Diverticulum of the female urethra; case reports. Urol. & Cutan. Rev. **40**:803-806, 1936.
4. Earlam, M. S. S.: Diverticula of the female urethra. Australian & New Zealand J. Surg. **4**:396-403, 1935.
5. Furniss, H. D.: Sub-urethral abscesses and diverticula in the female urethra. J. Urol. **33**:498-503, 1935.
6. Hall, E. R.: Diverticulum of female urethra. Northwest Med. **35**:379, 1936.
7. Herzenberg, G.: Konkremente der sog. Skénéschen Drüsen. Ztschr. f. Urol. **27**:152-155, 1933.
8. Holman, C. C.: Unusual urethral calculus. Brit. M. J. **1**:1072, 1935.

9. Hunner, G. L.: Calculus formation in a urethral diverticulum in woman: report of 3 cases. Urol. & Cutan. Rev. **42**:336-341, 1938.
10. *Idem:* discussion of Lower and Tormey.[14]
11. Johnson, C. M.: Diverticula and cyst of the female urethra. J. Urol. **39**:506-516, 1938.
12. Kaufmann, C.: quoted by McNally.[16]
13. Lewis, E. C.: A urethral diverticulum in a woman. Brit. J. Urol. **3**:41-43, 1931.
14. Lower, W. E., and Tormey, T. W., Jr.: Diverticulum of the female urethra. Ann. Surg. **107**:923-926, 1938.
15. Marion, H.: Volumineux calcul de l'urètre féminin enlevé par voie transvésicale. Bull. Soc. franç. d'urol. 121-124, Mar. 15, 1937.
16. McNally, A.: Diverticula of the female urethra. Am. J. Surg. **28**:177-181, 1935.
17. *Idem:* Diverticula of the female urethra: report of two additional cases. Illinois M. J. **69**:234-237, 1936.
18. Podleschka, K.: Diverticulum urethrae cum concremento. Zentralbl. f. Gynäk. **60**:2258-2261, 1936.
19. Riley, A., and Gaston, E. A.: Incontinence of urine due to ureteral ectopia. New Eng. J. Med. **211**:666-675, 1934.
20. Shivers, C. H. De T., and Cooney, C. J.: The formation of calculi in urethral diverticula of the female; report of a case. J. A. M. A. **102**:997-999, 1931.
21. Stevens, W. E.: Diseases and abnormalities of the female urethra. California & West. Med. **26**:471-475, 1927.
22. Szenteh, S.: Über einen auf vaginalem Wege entfernten Stein in der Harnröhre. Zentralbl. f. Gynäk. **58**:678-680, 1934.
23. Walters, W., and Thiessen, N. W.: Urethral diverticulum. Minnesota Med. **19**:218-220, 1936.
24. Watts, S. H.: Urethral diverticula in the male with report of a case. Johns Hopkins Hosp. Rep. **13**:49-89, 1906.
25. Winsbury-White, H. P.: Three recent cases of urethral calculi. Brit. J. Urol. **8**:50-54, 1936.
26. Young, H. H., and Davis, D. M.: *Young's Practice of Urology.* 738 pp. Vol. 2. Philadelphia: W. B. Saunders Co., 1926. P. 60.

MENINGITIS DUE TO *MICROCOCCUS TETRAGENUS**

Report of a Case with Recovery Following Treatment with Sulfanilamide

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THE organisms which are responsible for most cases of meningitis are the following: tubercle bacillus, influenza bacillus (*Hemophilus influenzae* of Pfeiffer), meningococcus, pneumococcus and streptococcus. Less frequently the following organisms have been reported to cause meningitis: colon bacillus,[1, 2] gonococcus,[3, 4] *Brucella abortus*,[5] staphylococcus,[6] *Micrococcus tetragenus*,[7] diphtheria bacillus,[8] actinomyces[9] and yeasts.[10]

Until quite recently, the mortality from meningitis, except that due to the meningococcus, has been alarmingly high. However, with the introduction of specific antiserums and with the use of sulfanilamide or its derivatives, the treatment of meningitis is far more hopeful. The mortality from meningitis due to the tubercle bacillus is still 100 per cent. Fothergill[11] has reported some encouraging results with the use of specific antiserum in cases of *H. influenzae* meningitis. Sulfanilamide plus the specific antiserums has lowered the mortality rate in cases of meningitis due to meningococcus[12] and pneumococcus.[13–17] The most startling results, however, have been obtained with the administration of sulfanilamide in cases of meningitis due to *Streptococcus hemolyticus*.[18–22] Whereas before the introduction of sulfanilamide in the treatment of this type of meningitis there was only an occasional cure, with this drug at our disposal it is now expected that the majority of cases will recover. This drug has also been found useful in treating cases of meningitis caused by some of the organisms less frequently encountered.[23] It becomes of primary importance, therefore, when dealing with a patient suspected of having meningitis, to resort to lumbar puncture as early as possible in order to determine the etiologic organism so that the proper treatment can be promptly instituted.

On account of both the rarity of the infecting bacterium and the successful outcome following the use of sulfanilamide, the following case of meningitis due to *M. tetragenus* is reported.

CASE REPORT

The patient, F. A., was an 18-year-old white boy. Until the present illness he had apparently been in good health. There had been no history of upper respiratory infection or discharge from the ears. On February 27, 1939, he went to bed with no complaints. He had a restless night, however, and the next morning when he tried to get up out of bed he felt quite dizzy. He dressed and went downstairs for breakfast, but became so sick that he returned to his bedroom, where he vomited and went back to bed. He vomited several times during the morning and then developed a headache. The temperature gradually rose during the morning and by noontime had reached 104°F. The next morning the temperature descended to normal, and the patient felt so well that he wanted to get up and go out. He had breakfast and luncheon and apparently relished the food. He took a nap in the afternoon, and when he awakened he complained of severe headache and stiff neck. The temperature rose to 100.3°F., and he had a very restless night with practically no sleep. His general condition the next morning, March 2, was worse in spite of medication. He complained of severe headache and rigid neck. It was deemed advisable to transfer him to the hospital.

There was nothing unusual in the family history or in the past history of the patient. Physical examination showed a young man lying in bed, complaining of severe headache and unable to move because of the fear of increasing it. The skin and mucous membranes were rather pale. There were several healed acne lesions on the face. The pupils were small, regular and equal. No tenderness could be elicited over the sinuses or the mas-

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toids. The throat was not injected, and the ears were normal. The neck was quite rigid, and there were no enlarged cervical nodes. The patient was unable to turn his neck laterally or anteroposteriorly. Examination of the chest was negative. The abdominal muscles were moderately rigid, and the abdominal reflexes were sluggish. Both knee jerks were absent. There were positive Kernig and Babinski signs on both sides. The patient was hypersensitive to touch. The temperature was 100.4°F., the pulse 106, and the respirations 26.

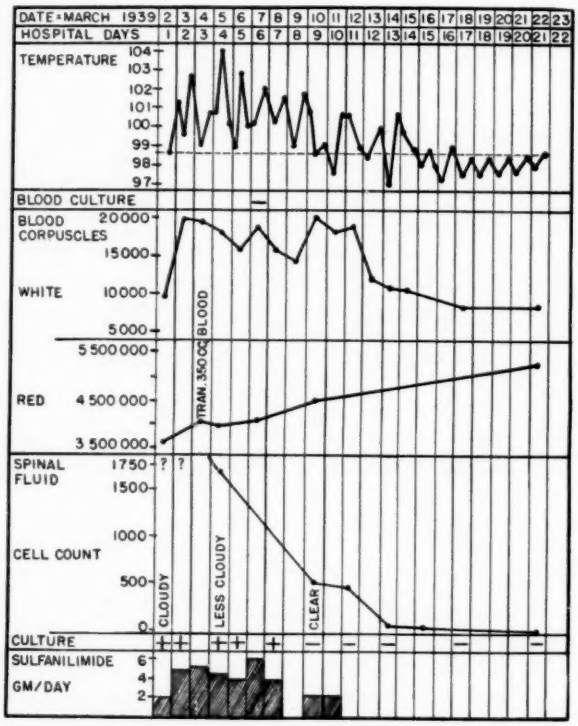
A lumbar puncture was done and about 20 cc. of turbid fluid was obtained, which contained much fibrin. The fluid drained rather slowly. A smear showed many pus cells, with polymorphonuclear leukocytes predominating. Many gram-positive diplococci were present. These were biscuit-shaped and somewhat larger than meningococci. They were surrounded with thick, halo-like capsules, and some were arranged in tetrads. The organisms were found both outside the pus cells and within them. Culture of the spinal fluid, on agar, yielded grayish-white, rather delicate colonies which were quite transparent. In broth there was a uniform growth throughout the fluid. A smear of the cultures showed the same type of organism as that found on direct smears of the spinal fluid: gram-positive, biscuit-shaped diplococci, also arranged in tetrads. The morphology, the staining reaction and the cultural characteristics of the organisms were consistent with those of *M. tetragenus*.[24] The urine examination showed 2+ albumin, 2 per cent sugar, a trace of acetone and an occasional granular cast. The blood showed a red-cell count of 3,680,000 with 70 per cent hemoglobin, and a white-cell count of 9900 with 92 per cent polymorphonuclears.

The patient was immediately put on sulfanilamide. During the night, he was very restless and was given 1/6 gr. of morphine. The next day, March 3, there was no change in his general condition. He still complained of severe headache, and his neck was rigid. Lumbar puncture was done, and 25 cc. of turbid fluid was removed. The patient seemed to rest a little more easily after the lumbar puncture, but again became restless during the night. He complained of pain in both ears, although examination of them showed no pathologic changes. The urine examination showed 1+ albumin and only a trace of sugar. The blood sugar was 160 mg. per 100 cc. On March 4 the general condition was slightly improved. The patient was given 350 cc. of blood with no reaction, but during the day he had several loose brown dejections. On March 5 he had difficulty in breathing through his nose, complained of pain in the right ear and was mentally somewhat confused. A lumbar puncture was done and only 8 cc. of fluid was removed. This was less turbid than the previous specimens, and there were fewer organisms present in the direct smear; the cell count was 1690. The blood sugar was 118 mg. per 100 cc. Urine examination was negative for albumin and sugar, and sugar did not reappear in any of the specimens examined after this date.

On March 6 the patient was nauseated and rebelled against fluids by mouth. He complained of severe headache and pain in both ears. He was seen by an otolaryngologist, Dr. Byron H. Porter, whose report was as follows:

> The mucous membrane of the nose was red and irritated. The septum had a high deflection to the right, encroaching on the right ethmoid labyrinth. There was some fresh, purulent overflow from the ethmoid walls [a culture of this yielded the same organism as that found in the spinal fluid]. Transillumination showed the frontal sinuses to be clear, and there was no clouding of the antra. The throat was moderately injected. The posterior pharyngeal wall showed evidence of a low-grade, chronic infection. Both eardrums were normal. There was no redness and nothing to account for the pain in the ears.

The patient was tapped again, with some relief of the stiffness of the neck. A blood culture was negative. He had more loose brown dejections during the day. The next day, March 7, the head was pulled to the left side, owing to the rigidity of the muscles on that side of the neck. A lumbar puncture was done and 15 cc. of fluid was obtained. This fluid was quite clear, and a direct smear showed no organisms, although cultures were positive. This was the last positive spinal fluid, and all positive specimens had shown the same organism. After



the tap, the patient had no more headache or pain in the ears. On March 10 the general condition was improved. The knee jerks were present though sluggish, the Kernig and Babinski signs negative and the abdominal reflexes more active. The patient appeared brighter. On March 11 he was able to move around in bed more easily, although toward night he again complained of headache and was unable to go to sleep without the help of medication. On March 12 his skin and lips had a bluish tinge. On March 13 his general condition was much improved. The patient could turn in bed more easily, and his general attitude was more cheerful. From this day on, the patient made an uneventful recovery. He was up and about on March 19, and was discharged from the hospital on March 23, free of any signs and symptoms referable to the nervous system. The accompanying chart shows graphically the course of the various factors in the case.

A perusal of literature brings out the fact that *M. tetragenus* is very rarely found as the cause of meningitis. This organism is ordinarily found in

the nose and throat, where it is not considered to be pathogenic. Although this patient gave no history of upper respiratory infection, it is likely that the organism gained entrance to the central nervous system from the right ethmoid sinus. It is obvious, therefore, that one should carefully examine the upper respiratory tract for possible foci of infection in these cases.

It is interesting to note that the urine examination on admission showed 2 per cent sugar and that the blood sugar the next morning was 160 mg. per 100 cc. All subsequent specimens of urine were found to be negative for sugar, and subsequent blood-sugar estimations gave a normal sugar level. Inasmuch as the patient had never had a history of glycosuria and had not been taking sweetened drinks or glucose before admission, it seems reasonable to assume that the temporary hyperglycemia and glycosuria were due to irritation of the midbrain.

It is regrettable that a blood culture was not done on the day of admission. Although a blood culture taken on March 6 was negative, the patient had already been taking sulfanilamide for five days. As this drug has a bacteriostatic effect on bacteria, we cannot tell whether the patient had a bacteremia due to *M. tetragenus* during the early part of the disease. Of course, the important question that arises in one's mind is how large a part sulfanilamide played in this case to effect a cure. This is difficult to answer. The mere fact that the drug was used and the patient recovered is no proof that it was responsible for the cure. A single case cannot decide this question. It is better to defer judgment on this subject until there has been more experience with sulfanilamide in this type of meningitis.

In following this case I gained the impression that in this type of meningitis one is not dealing with a very virulent type of organism, and that if the patient can be kept alive until he has manufactured enough immune bodies, he will recover. Were I again faced with the same situation, I should look for possible foci of infection in the upper respiratory tract, give supportive treatment, do a lumbar puncture as often as indicated by the patient's condition and give sulfanilamide in adequate doses.

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REFERENCES

1. Craig, W. S.: Meningitis in the newborn. Arch. Dis. Childhood **11**:171-186, 1936.
2. Braid, F.: *B. coli* meningitis in a newborn infant. Brit. M. J. **2**:895, 1928.
3. Branham, S. E.; Mitchell, R. H., and Brainin, W.: Gonococcic meningitis. J. A. M. A. **110**:1804-1806, 1938.
4. Strumia, M., and Kohlhas, J. J.: Gonococcic meningitis. J. Infect. Dis. **53**:212-218, 1933.
5. Poston, M. A., and Smith, D. T.: Successful treatment of Brucella meningitis with immune human serum: isolation of the organism by a modified cultural method. New Eng. J. Med. **215**:369, 1936.
6. Schless, R. A.: *Staphylococcus aureus* meningitis: treatment with specific bacteriophage. Am. J. Dis. Child. **44**:813-822, 1932.
7. Blum, L.; Vaucher, E., and Karbiener: Les méningités à tétragènes. Rev. de méd. **40**:577-594, 1923.
8. Reiche, F.: Eine durch Diphtheriebazillen und Streptokokken bedingte Meningitis. München. med. Wchnschr. **63**:562, 1916.
9. Morrison, D. B.; Humphrey, A. A., and Bailey, J. E.: Actinomycotic meningitis with a primary focus in the finger: report of case diagnosed during life. J. A. M. A. **110**:1552, 1938.
10. D'Aunoy, R., and Lafferty, C. R.: Torula meningitis in a child. Am. J. Clin. Path. **9**:236-238, 1939.
11. Fothergill, L. D.: *Hemophilus influenzae* (Pfeiffer bacillus) meningitis and its specific treatment. New Eng. J. Med. **216**:587-590, 1937.
12. Willien, L. J.: Sulfanilamide therapy in meningococcic meningitis. J. A. M. A. **110**:630-632, 1938.
13. Hewell, B. A., and Mitchell, A. G.: The treatment of pneumococcic meningitis with sulfanilamide: review of literature and report of six additional cases. J. A. M. A. **112**:1033-1037, 1939.
14. Reid, G. C. K., and Dyke, S. C.: Pneumococcal meningitis treated with M.&B. 693; recovery. Lancet **2**:619, 1938.
15. Sadusk, J. F., Jr.: Observations on sulfanilamide therapy in pneumonia and meningitis due to Type 3 pneumococci. New Eng. J. Med. **219**:787-790, 1938.
16. Weil, C. K.: Meningitis due to type I pneumococcus; report of a case with recovery due to serum therapy. Arch. Int. Med. **57**:514-520, 1936.
17. Cunningham, A. A.: Pneumococcal meningitis treated with sulfanilamide and M.&B. 693. Lancet **2**:1114, 1938.
18. Millett, J.: Hemolytic streptococcus meningitis: report of a case with recovery after the use of sulfanilamide and its derivatives. New Eng. J. Med. **217**:556-558, 1937.
19. Weinberg, M. H.; Mellon, R. R., and Shinn, L. E.: Two cases of streptococcic meningitis treated successfully with sulfanilamide and prontosil. J. A. M. A. **108**:1948-1951, 1937.
20. Keefer, C. S.: Sulfanilamide: its mode of action and use in the treatment of various infections. New Eng. J. Med. **219**:562-571, 1938.
21. Vitenson, I., and Konstam, G.: Case of streptococcal meningitis treated with prontosil. Lancet **1**:870, 1937.
22. Smith, F. W.; Mayer, K. F.; Agerty, H. A.; Fowler, R. H., and Layton, W. C.: Anaerobic beta hemolytic streptococcus meningitis of otitic origin treated with sulfanilamide and culminating in complete recovery. J. A. M. A. **110**:887-889, 1938.
23. Bloch, H., and Pacella, B. L.: Staphylococcic meningitis; report of a case in a seventeen day old infant successfully treated with sulfanilamide. J. A. M. A. **110**:508, 1938.
24. Zinsser, H.: *A Textbook of Bacteriology*. Sixth edition. 1059 pp. New York: D. Appleton-Century Co., 1931. P. 329.

REPORT ON MEDICAL PROGRESS

RADIATION THERAPY

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THERE are many benign conditions in which radiation can be used with benefit; most of these are diseases of the skin and are satisfactorily handled by the dermatologist. The specialist in radiation therapy is chiefly concerned with the treatment of cancer.

The technic of radiation is so important that it deserves special mention in any comprehensive discussion of the subject. Some confusion seems to exist as to the relative merit of x-ray and radium, and there is much controversy regarding the value of x-rays produced at potentials greater than 200,000 volts.

The amount of radiation from an external source which can be delivered to a deep-seated neoplasm such as a carcinoma of the cervix, bladder, esophagus and so forth is governed chiefly by two factors: first, the wave length of the beam; second, the distance of the source of radiation from the patient. The shorter the wave length of the beam the greater the penetrating power, and the greater the distance of the source of radiation the greater the dose arriving in the depths. The latter statement may seem paradoxical but is nevertheless true. The shortest, most penetrating rays generally available for therapeutic use are the gamma rays of radium. If radium could be obtained in sufficient quantities, it would be the ideal agent for external application. However, the supply of radium is so limited that its use at a distance of more than a few centimeters increases the time of treatment beyond practical limits. For this reason x-rays which can be produced in great intensities at comparatively little expense have largely replaced radium. Radium finds its chief use in relatively small, well-localized, accessible lesions in which the element can be implanted or with which it can be placed in direct contact. The fact is being generally recognized that large amounts of radium are unnecessary, and a sizable clinic today finds itself adequately equipped with from 100 to 200 mg. (about $5000 worth).

The wave length (penetrating power) of an x-ray beam depends on the voltage at which it is produced. The higher the voltage the shorter and more penetrating the beam. It has been pointed out that x-rays can be produced in huge amounts and therefore can be used at greater distances than is practical with radium. The usual deep-therapy machine employs a potential in the neighborhood of 200,000 volts. X-rays thus generated do not have the short wave length or the penetrating power of the gamma rays of radium. However, if the voltage is sufficiently increased, x-rays can be produced which are as short as or even shorter than the gamma rays of radium. Commercial x-ray units have recently become available which operate at 400,000 volts, and there are several specially designed machines which have developed potentials of 1,000,000 volts or more.[1] Van de Graaff and his associates[2] have carried out physical measurements on x-rays produced at more than 2,000,000 volts. The high-voltage research group at the Massachusetts Institute of Technology have recently obtained a grant for the construction of an electrostatic generator which is expected to produce radiation at 3,000,000 volts. It is planned eventually to use these rays, which will be shorter than radium rays, for medical purposes.

These higher-voltage x-rays, technically called "supervoltage rays," possess a number of advantages. The skin tolerates this type of radiation better than it does 200,000-volt radiation, and larger doses can be administered without the danger of serious damage to the superficial tissues. Because of the greater penetrating power, larger amounts of radiation can be delivered to the depths than is possible at 200,000 volts (in some cases the difference is as high as 20 per cent). The untoward general reaction of the patient is less when the shorter wave lengths are employed. Most observers who have worked with supervoltage machines report more satisfactory regression of deep-seated cancers, but this type of apparatus has been in use for such a short time that significant end results are not available.

GENERAL CLINICAL CONSIDERATION

One of the greatest advances in radiation therapy had its beginning in Coutard's[3] work at the Radium Institute in Paris. He demonstrated that much larger doses of x-ray could be tolerated by the skin than had previously been considered safe. Before the publication of Coutard's observations, it was bad practice for a radiologist to produce more

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than a mild redness of the skin. Today, the development of a severe dermatitis following the administration of a curative dose of radiation to a malignant neoplasm is the rule rather than the exception. Such reactions are characterized by blistering and even mild ulceration. They usually subside within a week or two. During the acute stage, the affected area should be kept clean with soap and water and a thin coating of vaseline or lanolin applied.

Following x-ray or radium treatment, a general reaction known as roentgen sickness sometimes develops. This manifests itself by anorexia, nausea and vomiting. The cause of this reaction is not well understood. The inhalation of ozone from high-tension electrical apparatus undoubtedly plays a part in some cases. Masks which remove ozone have been devised for the patient to wear during treatment. Plenty of rest and the ingestion of large amounts of sugar during the series of radiation treatments may help.

The mucous-membrane reaction following radiation frequently causes the patient more discomfort than the skin reaction. After treatment of the mouth and throat the patient may experience considerable pain, with difficulty in masticating and swallowing food. The diet should be limited to fluids and soft solids, and a solution of aspirin in water should be held in the mouth and used as a gargle. Opiates may be necessary for a few days. In cases of carcinoma of the larynx, the edema resulting from radiation occasionally blocks the passage of air completely. Facilities for a tracheotomy should be close at hand. Irradiation of the abdomen may cause sufficient irritation of the intestinal mucosa to produce diarrhea, sometimes with blood in the stools. Opium in the form of paregoric usually gives relief.

Any operative procedure in an area which has been heavily irradiated should be undertaken with caution. This applies particularly to the mouth and throat. Changes occur in the normal tissues, chiefly vascular, which lower their resistance to infection. I have seen the extraction of a tooth result fatally in a patient irradiated two years previously for carcinoma of the mouth.

Since the administration of a curative dose of radiation is not entirely without hazard and may cause, temporarily at least, additional suffering, it behooves the radiologist to distinguish as best he can among those cases which will be benefited by his therapy and those which are hopeless. Unfortunately, this is a difficult thing to do. The pathologist has afforded some help in the prognosis by grading the malignancy of tumors according to their microscopic appearance. It may be said in general that rapidly growing tumors of high malignancy are likely to regress under radiation but are prone to recur and metastasize. Low-grade, slowly growing tumors are more resistant to radiation, but if they can be brought under control there is a greater chance of permanent cure of the local lesion and less chance of secondary deposits. It is known that some neoplasms are entirely unresponsive to radiation. For example, a melanoma of the skin may continue to grow even after the surrounding normal tissue has been ulcerated, whereas an epithelioma in the same individual may be made to disappear quite readily under radiation. The two most important factors in prognosis are size and accessibility of the tumor. A small, superficially located lesion may respond satisfactorily to a single intensive dose of x-ray or radium, whereas a large or deep-seated lesion may prove to be incurable after weeks or even months of treatment.

RADIOLOGICAL MANAGEMENT OF THE COMMONER TYPES OF CANCER

Some of the most brilliant results of radiation therapy are obtained in the treatment of cancer of the skin. There are two principles to be followed in the radiation of any new growth: first, a uniform distribution of energy throughout the lesion of sufficient intensity to destroy all neoplastic cells; second, a minimal amount of damage to adjacent normal structures. In deep-seated lesions it is often difficult to fulfill these conditions. However, in the treatment of cancer of the skin it is comparatively easy to irradiate the diseased area uniformly and intensively without serious necrosis in the surrounding tissue. We[4] recently reviewed a large series of epitheliomas and divided them into three groups according to their sizes. The first group included those lesions not greater than 1 cm. in diameter; the second group, those between 1 and 2.5 cm.; and the third group, those lesions greater than 2.5 cm. In the first group it was found that 98 per cent were curable by radiation. In the second group the results were almost as good. However, in the advanced cases the three-to-five-year cures fell off to a bare 50 per cent. This illustrates the great necessity of early diagnosis and treatment. It has been shown that cancer involving the cartilage of the wing of the nose is entirely amenable to radiation and does not require surgical removal with plastic operation. Lesions involving the cartilage of the ear, however, usually do poorly and are best treated by operative removal. Epitheliomas adjacent to the eye should be radiated. The results are functionally and cosmetically better than when surgery is employed. In cases where radiation has been given a fair trial but has failed to cure the disease, surgery should be resorted to.

The method of treatment of the local lesion of carcinoma of the lip is still in some dispute. In

many clinics all lesions of the lip are radiated. However, a small, well-localized carcinoma in this region is easily curable by V excision and the patient is subjected to less discomfort than he is with radiation. Large lip lesions which would require plastic closure following surgical removal should in general be treated by radiation. Fortunately, carcinoma of the lip is a relatively benign lesion and only a small percentage of the cases develop metastases in the nodes of the neck. Metastatic nodes should in general be removed surgically. They are usually radio-resistant.

The majority of lesions of the buccal mucosa, tongue, pharynx and larynx are now treated by radiation. Small, localized lesions in the anterior part of the mouth or in the larynx are amenable to surgery, but these constitute a small percentage of the cases which come under observation. The clinical diagnosis of carcinoma of the mouth usually presents no difficulty to one familiar with this condition, but certain inflammatory processes may give rise to confusion. The importance of a biopsy on all suspicious lesions should be strongly emphasized, for early diagnosis is of paramount importance.[5]

The treatment of early, localized carcinoma of the breast is primarily a surgical problem. When the disease is confined to the breast with no axillary or more distant metastases, five-year cures result in about 70 per cent of cases subjected to radical mastectomy. When the axillary nodes are involved this figure is reduced to about 20 per cent. Most radiologists have dispensed with routine preoperative radiation, but postoperative x-ray treatment should be given to all cases showing involvement of the axillary nodes. Care should be taken in selecting cases suitable for surgery, since removal of the breast in a case which is primarily inoperable usually makes a bad matter worse. Contraindications to surgery are nodes above the clavicle, metastases in the viscera or bones and inflammatory types of carcinoma (carcinoma *en cuirasse*). In young women sterilization by x-ray is of value, particularly in those cases which have developed bone metastases. The pain resulting from secondary deposits in the bones may often be relieved for considerable periods by x-ray therapy.[6]

Radiation is the method of choice in treatment of carcinoma of the cervix. Radium is to be relied on primarily, but the addition of external treatment with high-voltage x-ray improves the results, particularly in advanced cases.[7]

Carcinoma of the body of the uterus (endometrium) should be treated by hysterectomy. Many surgeons combine radiation with operation. Those cases which are inoperable frequently do well with radiation alone.

Ovarian carcinoma should also be treated surgically. In inoperable or recurrent cases, external radiation may serve to hold the disease in check and retard the accumulation of fluid in the abdominal cavity. It is rarely curative.

Malignant lesions of the bladder, if not too far advanced, should be treated by surgical removal or radium implantation. In extensive lesions, much palliation can be secured by supervoltage x-ray treatment.[8]

Carcinoma of the prostate is usually radio-resistant, although an occasional case responds well to a combination of radium implantation and x-ray treatment. The pain resulting from metastases to the spine and pelvis can frequently be relieved by radiation.

Embryoma of the testicle is frequently radiosensitive. Many surgeons prefer to radiate these tumors before removing them. It is also well to give prophylactic radiation to the abdomen and chest. Even though metastases develop, they can often be controlled by x-ray treatment.[9]

The only kidney tumor showing marked radiosensitivity is the Wilms tumor. However, other types of neoplasms can frequently be reduced in size, and hemorrhage from tumors invading the renal pelvis may be allayed by external radiation.

Neoplasms of the stomach, liver, gall bladder, pancreas and colon are not amenable to x-ray or radium therapy. However, an occasional case of carcinoma of the rectum does well under radiation. Carcinoma of the esophagus can be made to regress by external radiation, but a dose sufficiently great to destroy the neoplasm usually causes ulceration which results in a fatal mediastinitis.

Carcinoma of the bronchus is usually not responsive to radiation, although there is an occasional rare exception.

Primary osteogenic sarcoma is generally radio-resistant, and if favorably located should be treated surgically. Ewing's tumor is very radiosensitive and x-ray therapy is the method of choice in such cases. An occasional giant-cell tumor does well, and much palliation is frequently secured in cases of multiple myeloma.

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REFERENCES

1. Dresser, R.; Trump, J. G., and Van de Graaff, R. J.: The production of supervoltage roentgen rays by means of an electrostatic generator. Am. J. Roentgenol. **38**:758-761, 1937.
2. Van de Graaff et al.: unpublished data.
3. Coutard, H.: Roentgen therapy of epitheliomas of the tonsillar region, hypopharynx and larynx from 1920 to 1926. Am. J. Roentgenol. **28**:313-331, 1932.
4. Dresser, R., and Dumas, C.: Radiological treatment of cancer of the skin. Urol. & Cutan. Rev. **42**:295-297, 1938.
5. *Idem:* Radiation treatment of carcinoma of the buccal cavity. Am. J. Roentgenol. **36**:939-945, 1936.
6. Dresser, R., and Pelletier, V.: The radiological management of cancer of the breast. New Eng. J. Med. **214**:720-723, 1936.
7. Meigs, J. V., and Dresser, R.: Carcinoma of the cervix treated by the roentgen ray and radium. Ann. Surg. **106**:653-667, 1937.
8. Dresser, R., and Rude, J.: Supervoltage roentgen treatment of carcinoma of the bladder. J. A. M. A. **111**:1834-1837, 1938.
9. Smith, G. G.; Dresser, R., and Mintz, E. R.: Radiation treatment of tumors of testicle. J. Urol. **34**:462-469, 1935.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTEMORTEM AND POSTMORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 25361

PRESENTATION OF CASE

A six-year-old colored girl was admitted to the hospital because of the presence of purpuric spots in the skin.

The child was apparently well until one and a half weeks before admission when she developed several painless "spots" in the skin which persisted until entry. Other similar bruises appeared after almost insignificant injury to the skin. There were no other complaints until four days before admission when she stated that her stomach "hurt." She later began to vomit, usually after meals, the vomitus consisting of ingested food. The abdominal discomfort was never localized by the child, appeared to be mild in severity, and seemed to be present usually before the act of vomiting. She complained of weakness and malaise, but had no other symptoms. In the past, she had had whooping cough seven months before admission with uneventful recovery. The patient had been a state ward for three years. Nothing more of the family or past histories was known. So far as could be determined there had been no contact with lead or benzol.

Physical examination revealed a well-developed child who appeared nervous and apprehensive. On the skin of the forehead, the right eyelid, the left upper arm and the skin of the legs were several dark red and purple ecchymoses which measured from 2 mm. to 2 cm. in diameter. The skin of the abdomen and back was clear. The conjunctivae, the gums and the palate showed small petechial hemorrhages, both old and recent. The heart and lungs were negative. The abdomen was diffusely tender to deep pressure but showed no spasm. The patient complained of pain when any part of the body was handled or maneuvered by the examiner.

The temperature was 100.5°F., the pulse 148, and the respirations 48.

The urine examination was negative. The blood examination showed a red-cell count of 1,400,000 with 29 per cent hemoglobin (Sahli). The hematocrit was 10.1. The white-cell count was 2,000 with 18 per cent polymorphonuclears and 82 per cent small lymphocytes. There were approximately 10,000 platelets per cubic millimeter, and the reticulocytes numbered 0.8 per cent. The red blood cells showed some anisocytosis and poikilocytosis. The blood clotting time was 5 minutes, with positive retraction of the clot; the bleeding time was 2 hours. A tourniquet test of 7 minutes produced thirty petechiae, each with a circle 2.5 cm. in diameter. A fragility test showed hemolysis in from 0.36 to 0.22 per cent salt solution, with the control test 0.38 to 0.22. A wet blood mount showed no sickle cells. Stool examinations revealed 4+ guaiac tests. A blood culture was negative. A blood Hinton test was negative. The throat culture was negative for beta hemolytic streptococci.

X-ray films of the skull, pelvis, femora, tibiae, spine, arms and wrists were all normal for the age of the patient. A chest plate was negative. The spleen was not enlarged on the flat abdominal plate. An electrocardiogram was negative, with a rate of 150.

The patient ran a slow, steady, downhill course. The temperature ranged from 99 to 104°F. but averaged about 101. The pulse varied between 90 and 160 per minute, but averaged about 140. The red-cell count and hemoglobin levels fell steadily, in spite of six transfusions totaling some 4000 cc. of blood, to 630,000 and 24 per cent, respectively. The white-cell count fell to 1100. The polymorphonuclear count averaged 8 per cent, most of the cells being small lymphocytes; an occasional myeloblast was seen. The reticulocyte count fell to zero, and no platelets were observed in the smear. Purpura continued and the child developed a severe almost persistent epistaxis which could not be adequately controlled. On the thirty-ninth hospital day the left border of cardiac dullness was percussed 6.5 cm. from the midline, 2 cm. outside the nipple line. The right border of cardiac dullness was at the right sternal edge; thereafter its size was not noted to change. A blowing systolic murmur was heard. Treatment included a high-vitamin diet, with liver (intramuscularly), calcium, iron and symptomatic care.

Terminally, hematuria developed and a few rales were heard at the bases posteriorly. The patient died on the fifty-second hospital day.

DIFFERENTIAL DIAGNOSIS

DR. LOUIS K. DIAMOND*: So far as could be determined this patient had had no contact with lead or benzol. We always seem to inquire for the possibility of lead intoxication in the presence of any anemia, and yet by actual experience we have still to see a case of purpura with anemia as a result of lead intoxication, even in the most severe

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and acute forms. The usual lead intoxication with severe symptoms and a high level of lead in the blood produces a secondary hypochromic anemia, without reduction of platelets and no purpuric tendency so far as we have been able to find.

The evidence on physical examination and blood examination was in favor of this being an aplastic blood state, with very little evidence of regeneration. The reticulocytes were low, and there is no mention of nucleated red cells; the platelets were low, white blood cells low, and hemoglobin also low, with a color index of 1.0. In other words there was failure on the part of the bone marrow to produce or deliver cells of all types. As for x-ray findings we are chiefly interested here in the possibility of any changes in the long bones, seen particularly in the malignant processes such as leukemia and lymphoblastoma. In leukemia one frequently sees at the growing ends of the long bones, that is, just proximal to the metaphyseal lines, a line of rarefaction. This is not specific for leukemia but is seen so frequently that the diagnosis is suggested by the finding of this line. However, this occurs in only about a third of the cases of malignant blood diseases in growing infants and children; therefore in two thirds we find no such changes, particularly in the acute leukemias where the condition has been present for only a matter of a few weeks. The bone changes may not have had time to develop.

The cardiac manifestations seem to have been those of decompensation, secondary to cardiac dilatation due to very severe and rapidly increasing anemia. If one attempted to approach this diagnosis from a study of the blood smear itself, which I had the privilege of seeing before this exercise, one could only say that there was a severe aplasia, very few immature cells of any of the series, red cells particularly, no platelets and no changes in the character of the red or white cells. Some of the polymorphonuclear neutrophils were relatively young, that is, late myelocytes, but there were apparently no characteristic immature blast forms among the lymphocytes or mononuclear cells. There were a few very large cells with basophilic cytoplasm but too few to be diagnostic of one particular type of blood malignancy. This does not mean that the bone marrow and the other hematopoietic organs in the body could not have been infiltrated with malignant cells, and yet no such cells were seen in the peripheral blood. Such a state occurs very frequently in children, particularly in these so-called acute leukemic states. However, on the basis of personal experience I think that this type of severe aplastic anemia occurs most frequently following known or unknown infection — I say "unknown" meaning undiscovered during the life of the patient. About 75 per cent of such severe aplastic anemias have been proved either in life or at postmortem to be due to widespread infection of many organs, usually with a bacteremia or septicemia, or to some unknown toxin. Frequently the bone marrow shows extreme aplasia, as if subjected to the action of a toxin such as benzol. Yet one finds no evidence in life or even at postmortem examination of any known toxin. The remaining 25 per cent of cases with this type of story and course have been due to malignancy of one sort or another, usually lymphoblastoma or so-called leukopenic or aleukemic leukemia, without necessarily any evidence of blood-stream invasion, that is, no characteristic lymphoblasts or malignant cells in the peripheral blood. This type of invasion of the hematopoietic organs, particularly of the bone marrow, can very well produce secondary aplasia as severe as this. The spleen and lymph nodes do not necessarily have to be involved in this acute process, although it is worth remembering that without recognized splenomegaly during life the spleen at postmortem may be somewhat larger than normal. The abdominal pain is interesting because many children with acute or subacute leukemia have, as the initiating complaints, severe abdominal pain and vomiting. In such cases these symptoms may be due either to the extension of the purpuric tendency to the bowel, with hemorrhages into the mesentery and the mucosa, or to enlarged lymph nodes throughout the mesentery and intestinal tract. These points are in favor of acute aleukemic leukemia, but the possibility of acute aplastic anemia cannot be ruled out.

DR. HAROLD L. HIGGINS: Our differential diagnosis centered around aleukemic leukemia and aplastic anemia. In the absence of definite evidence pointing to aleukemic leukemia, we made a diagnosis of aplastic anemia.

These patients are very pathetic. They are alert mentally but uncomfortable by reason of nasal packs used to stop the bleeding. We kept this child alive for weeks with transfusions which were quite expensive and time consuming; yet one feels duty bound to keep trying in the hope that perhaps something may happen for the better.

DR. DIAMOND: There is possibly one additional point against ordinary aplastic anemia, namely the rate at which the transfused red cells disappeared from the peripheral blood. Ordinarily a patient with chronic aplastic anemia can be kept alive for months by transfusion every two or three weeks.

DR. HIGGINS: In spite of hemorrhages?

DR. DIAMOND: I did not consider that. Of course severe recurrent hemorrhages could coun-

teract the beneficial effects of frequent transfusions.

Clinical Diagnosis

Aplastic anemia.

Dr. Diamond's Diagnosis

Acute aleukemic leukemia (aplastic phase)?
Acute aplastic anemia, due to infection or unknown toxin?

Anatomical Diagnoses

Aplastic anemia.
Hemorrhagic bronchopneumonia.
Purpuric hemorrhages of skin, intestinal mucosa, serous surfaces, right renal pelvis.
Cortical abscess of left kidney.

Pathological Discussion

Dr. Tracy B. Mallory: I do not know that the postmortem examination helps very much except to add some facts. The bone marrow was completely aplastic in both the long and the flat bones. One could find only minimal erythrogenic areas and virtually no white-cell formation. The number of phagocytes was considerably increased, and there was a great deal of hemosiderin in them. Whether that was part of the purpuric process, I do not believe we can say.

As regards infection, we found a single abscess in the cortex of the kidney, which was evidently of long standing because it was very thoroughly encapsulated and had a dense wall of leukocytes and plasma cells. It was only a centimeter in diameter, and it is hard to believe that it could have been important in the picture. There was a terminal bronchopneumonia, and there were petechial hemorrhages scattered throughout the viscera just as in the skin, the intestinal tract containing a great many. I have no explanation to offer for the abdominal pain, unless it was due to the intestinal hemorrhages. There was a little free blood in the peritoneal cavity, which in itself could provoke a peritoneal reaction, but it seemed hardly enough in this instance to make that likely. The pericardium contained some excess fluid, and since the heart weighed only 100 gm., I think it probably accounts for the apparent enlargement of the heart.

I have nothing to offer as to the etiology. In adults I think we are getting more and more skeptical of the diagnosis of idiopathic aplastic anemia. Most of the cases which present that clinical picture turn out at autopsy not to have aplasia. They often have hyperplastic marrows, sometimes with extensive extramedullary hematopoiesis. Those in another group present diffuse neoplastic changes throughout the marrow. The true primary aplastic anemia is very rare, although unquestionably commoner in children. Dr. Diamond has had much more experience with that than I have.

CASE 25362

Presentation of Case

A sixty-five-year-old woman was admitted to the hospital complaining of abdominal pain of four years' duration.

The patient had made frequent visits to the Out Patient Department for a period of eleven years before her present admission. She stated that she enjoyed coming to the clinics because she got so little diversion at home. She had been treated in the eye and ear departments from eleven until five years before entry for corneal opacities, myopic astigmatism, presbyopia and deafness. She was followed in the dental and orthopedic clinics for minor complaints. In the medical department five years before entry she complained of attacks of precordial pain which were supposedly relieved with nitroglycerin. A chest plate showed a heart enlargement in all diameters, with calcification of the arch of the aorta. The blood Hinton test was negative, and the blood pressure 194 systolic, 90 diastolic. Rest was prescribed, and later, small daily doses of digitalis were administered. Subsequently, about three years before entry, she complained of precordial distress and palpitation associated with a cold which was accompanied by a productive cough, nausea and diarrhea. Examination at that time revealed a regular pulse of 88, with heart sounds of good quality and a blood pressure of 150 systolic, 86 diastolic; the lungs were normal. She soon recovered from the cold but complained frequently of feeling "miserable" and of "terrible palpitation." She continued to take daily doses of digitalis and phenobarbital, which had been prescribed. Two years before admission she began complaining of abdominal cramps with the "least bit of food" ingested at mealtime, and one month later noted abdominal pain with only a drink of water. Because of the patient's forebodings about cancer, which she stated was "in the family," a gastrointestinal series was done ten months before entry; this was reported as negative. She was fairly well until about two months before admission when she developed a cold which left her in a "terrible condition." She then noted headache and pains in the chest, back, left arm and legs. She ate little and lost weight, although the amount was not stated. She had had one episode of diarrhea, which she thought was the result of eating baked beans. She stated that she had had occasional attacks of abdominal cramps and had experienced the sensation of a lump in her abdomen

which seemed to move from "left to right." She further stated that for thirty years she had suffered attacks of diarrhea following excitement.

The family, marital and past histories were noncontributory.

Physical examination revealed a partially deaf, white-haired woman who had many complaints but was in no obvious distress. There was apparent evidence of recent weight loss. There were bilateral partial corneal and lenticular opacities, and the vessels of the fundi were reported as "sclerotic." The heart was in the upper limits of normal size, the rhythm was regular at 78, and there was a soft apical systolic murmur. The sounds were distant. A_2 was greater than P_2, and the blood pressure was 178 systolic, 88 diastolic. Examination of the abdomen revealed a diastasis recti, with generalized tenderness over the large bowel. A non-tender tangerine-sized mass was palpated in the right lower quadrant, and a similar firm, ballotable one was noted to the left of the umbilicus. The liver, kidneys and spleen were not felt. By rectal examination a soft non-tender mass the size of an ovary was palpated between the rectum and sacrum. The remaining examination was essentially negative.

The urine sediment contained 12 white cells per high-power field. The blood examination showed a red-cell count of 4,400,000 with 80 per cent hemoglobin, and a white-cell count of 7000 with 62 per cent polymorphonuclears; the smear was normal. A phenolsulfonephthalein test showed 12 per cent excretion in fifteen minutes, and 47 per cent in seventy-five minutes. The serum protein was 6.8 gm. per 100 cc., and the nonprotein nitrogen 23 mg.; the chlorides were equivalent to 99.5 cc. of N/10 sodium chloride. An electrocardiogram showed a normal tracing. A spinal-fluid examination was negative.

A barium enema showed a constant defect, 4 or 5 cm. in diameter, which appeared to rise from the medial aspect of the ascending colon. The mass was lobulated and ulcerated, and lay largely in the lumen. A second mass, 9 cm. in diameter, was noted in the left midabdomen. It was smooth and sharp in outline, and in it a constant fleck of calcium was seen. The lesion did not compress or displace the bowel and in several views was seen to be as much as 5 cm. from the lower pole of the kidney.

A flat plate and an intravenous pyelogram taken in the Out Patient Department a few days before admission showed a sharply defined 9-cm. mass partially overlying the lower end of the left kidney. It contained a small area of calcification in its upper and outer quadrant. There was prompt excretion of the dye, which filled normal-sized and normal shaped kidney pelves and ureters. The mass was of approximately the same density as the kidney and remained in constant relation with the kidney. Films of the chest were negative, except for a primary Ghon's tubercle in the right upper lung field. The heart size was within normal limits.

On the seventh day an operation was performed.

Differential Diagnosis

Dr. George G. Smith: "By rectal examination a soft non-tender mass the size of an ovary was palpated between the rectum and sacrum." That is misleading. I do not believe it is possible to feel the ovary in that position. I think it probably was a lymph node.

"The urine sediment contained 12 white cells per high-power field." I do not know whether it was a catheter specimen or not. If it was not, such a statement has absolutely no significance.

The phenolsulfonephthalein test was somewhat low. One would expect better than 12 per cent excretion in fifteen minutes. However, a good deal depends on the way the test was done, and whether the patient had a catheter in the bladder at the time. If you try to have a patient void every fifteen minutes it is apt to be a rather unsuccessful procedure. The total of 47 per cent in seventy-five minutes is slightly lower than normal, but not markedly so.

The great majority of this patient's symptoms seem to have been so inconsequential that there is not much to discuss until we get down to the examination of the masses in the abdomen. You will remember that a preceding gastrointestinal examination, which I presume included a barium enema, was done ten months before, and showed nothing abnormal. So we must assume that this mass had grown quite rapidly, although the patient had had gastrointestinal symptoms for quite a long time, obviously much longer than the organic disease which was demonstrated would account for.

In summarizing I should say that we are presented with the story of a sixty-five-year-old woman most of whose symptoms, although varied, can be considered as having little if any relation to her condition on entry. The recent symptoms which seem to have been of importance were chiefly of gastrointestinal origin. She had cramps suggestive of something wrong with the large bowel, although even a drink of water which obviously had gone no farther than the stomach, apparently aroused attacks of pain immediately after ingestion. There were a few pus cells in the urine, a finding which does not seem to be of great importance.

The positive findings consisted of the demon-

stration by x-ray of an ulcerative mass, 4 or 5 cm. in diameter, in the ascending colon, which seemed to project into the lumen of the colon. There was a second mass in the left side of the abdomen, and there is some question in my mind as to whether that was the same mass which was described in the reports of the intravenous pyelogram and of the flat plate of the abdomen. If so, the size varied somewhat. I think it was probably the same mass, and to carry out that suggestion is the fact that there was a fleck of calcium found in the mass in both x-ray films. In the first film this mass was seen to be as much as 5 cm. from the lower pole of the kidney. In the intravenous pyelogram the mass overlay the lower end of the kidney and remained in constant relation with it. We do not know how much care was taken to check the accuracy of that statement. Undoubtedly it overlay the kidney and remained in the same relation in an intravenous pyelogram film, but whether the patient was turned and whether the mass was pushed around in the abdomen and plates taken afterward in order to demonstrate whether it was in actual connection with the kidney, I do not know. I am inclined to believe from the history that only two masses were demonstrated. There was a mass in the right colon and one in the left side of the abdomen, which one observer thought was in constant relation to the kidney and another found to be separated from the kidney by as much as 5 cm.

On the seventh day an operation was done. I cannot see from the history as I read it that there was any primary disease in the urinary tract. If the left-sided mass was definitely in relation to the kidney, I think it was probably secondary and came from the original mass which I believe to have been in the ascending colon. I should think that lymphosarcoma or some form of lymphoid tumor would probably be the most likely diagnosis. The fact that the intravenous pyelogram showed a normal pelvis and calices in the left kidney and the fact, which I am assuming and which is all I can do on the evidence that I have here, that the mass which was found in relation to the left kidney was probably the same mass which at times was 5 cm. away from the kidney, lead me to think it was certainly not a primary tumor of the kidney, most certainly not a hypernephroma or renal-cell carcinoma. It is possible for metastases to develop close to the kidney. I remember one woman who, a number of years after her breast had been removed for carcinoma, presented herself with symptoms of obstruction in the left kidney; to make a long story short we demonstrated a mass just below the kidney pelvis over which the ureter hooked. We thought that this mass probably arose from the kidney, but on operating I found the mass right in between the lower pole of the kidney and the lower aspect of the kidney pelvis. The mass was an adenocarcinoma and probably a late metastasis from the breast. So you can get metastases from other places which can be deposited anywhere in and around the kidney, particularly, I should say, at the lower pole. Lymphosarcoma of the intestine, according to Ewing, is quite likely to metastasize to the kidney area.

I think we must ask the radiologist if he can give us any further help.

Dr. Richard Schatzki: The film taken at the end of the barium enema showed this filling defect slightly above the ileocecal valve, possibly involving it. The spot films do not add anything in particular to this appearance. Glancing through the films I cannot see definite evidence of ulceration but there are some pictures which certainly suggest it. The lesion in this region is a lobulated mass and definitely intrinsic. There is no evidence of obstruction produced by the mass. As regards the other mass on the left side of the abdomen I have looked through the films as carefully as I could and I cannot find a single film in which the 9-cm. mass is separated from the kidney. It overlies the kidney in all the films.

Dr. Smith: You think there are only two masses demonstrated?

Dr. Schatzki: Yes; one in the ascending colon and one on the left side which has a constant relation to the left kidney, though the lower pole of the kidney seems to be visible within the shadow of the mass.

Dr. Smith: The fact that Dr. Schatzki has drawn attention to, namely that there really is no evidence that this mass has ever been seen separated from the kidney, puts a different aspect on the problem. On the basis of the x-ray evidence we have to assume that this mass was definitely connected with the kidney. It was not an infiltrative growth which was invading the kidney, otherwise it would have produced a disturbance in the outline of the lower calices. It almost seems as if it overlay this part of the lower calyx and still did not cause any distortion. What might it have been? Possibly a solitary cyst because, as Dr. William F. Braasch, of the Mayo Clinic, has pointed out, a cyst of the kidney gives a more dense shadow than does a tumor of the kidney. The calcification, I suppose, might exist in the wall of the cyst. I have seen a very markedly calcified cyst, but if that were the case I do not see how to hook it up with a lesion in the bowel. Some cysts are malignant, but the lesion in the bowel is apparently a

proliferative one and does not look to me like the ordinary form of infiltrating carcinoma. Of course this might have been a misplaced piece of adrenal tissue which had formed an adrenal tumor. There is nothing, such as hirsutism, change of voice, and so forth, in the history of the woman's condition which would lead me to suspect an increased quantity of hormones from an adrenal tumor.

I shall stick to a diagnosis of sarcoma of the kidney, whether lymphosarcoma or not I do not know. I think there is a relation between the two tumors, and with the evidence that we have, I shall guess that the renal tumor is the primary lesion and that the lesion in the bowel is secondary. Carcinoma is more likely to be infiltrative in the kidney, whereas a sarcoma which has developed from the tissues in the capsule of the kidney has a tendency to spread outward.

A Physician: I should like to ask Dr. Schatzki if the mass on the left could be a dermoid cyst.

Dr. Schatzki: So far as the position is concerned, it could be. However, this mass did not shift in regard to the kidney. In other words, it was probably retroperitoneal and dermoids are apt to be intraperitoneal. Another thing, you have no positive evidence of dermoid: there are no teeth and nothing to make you think particularly of it.

Clinical Diagnoses

Carcinoma of ascending colon.
Retroperitoneal tumor.

Dr. Smith's Diagnosis

Sarcoma of kidney, with metastasis in bowel.

Anatomical Diagnoses

Adenocarcinoma of cecum.
Renal adenocarcinoma of left kidney.

Pathological Discussion

Dr. Tracy B. Mallory: I think we can all imagine the astonishment of the man who went poring through this outpatient record that weighed several pounds, undoubtedly making a diagnosis of neurosis as the negative evidence accumulated, who then suddenly found on routine physical examination that the patient did have something that could not be overlooked in the form of two intra-abdominal masses. The members of the X-Ray Department in the hospital committed themselves a little more definitely than Dr. Schatzki has done here and said that they thought the tumor in the bowel was a primary carcinoma. I do not believe they made any definite statements in regard to the tumor in the region of the kidney. After a period of study the patient was transferred to the surgical service and explored by Dr. Arthur W. Allen, with a preoperative diagnosis of primary carcinoma of the sigmoid and a retroperitoneal tumor. As soon as he got into the abdomen he found that there was a retroperitoneal tumor in the left kidney region. After working down to it, it proved to be an operable tumor of the kidney and he resected it. It was a renal adenocarcinoma growing almost entirely outward and not inward and therefore not deforming the pelvis in the slightest degree. On his way out from the nephrectomy he decided to short-circuit the intestine around the tumor in the cecum, so he did a lateral anastomosis.

The patient made a successful convalescence from the first operation, and a few weeks later Dr. Allen went in again and resected the cancer of the cecum. A few metastases were found in mesenteric nodes but no generalized metastases. The patient is now convalescing from the second operation and has no more and probably no fewer symptoms than she had before it all started.

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THAT "SPOT ON THE LUNG"

Elsewhere in this number of the *Journal*, the article entitled "The Evolution of the Treatment of Pulmonary Tuberculosis at the Rutland State Sanatorium" presents in Chart 1 the admission classification of tuberculosis in patients over the past decade. It is of interest that the percentage of minimal cases admitted over that period has varied little from the average of 12 per cent. This figure, however, compares favorably with the report[1] of the Council on Medical Education and Hospitals of the American Medical Association that all tuberculosis sanatoriums in this country show an average of only 13 per cent of patients admitted with minimal disease. Stated otherwise, 87 per cent of these patients do not receive treatment until the disease is in the advanced stage.

The reduction of tuberculosis mortality in recent years may be phenomenal, but deaths from tuberculosis still hold seventh place in Massachusetts and in the nation as a whole, and only a pitifully small number, 13 per cent, of cases are recognized in the minimal stage when treatment is most effective.

What are the causes of this sorry state of affairs? Three factors would appear to play a part. First, there is the casual disregard of early signs and symptoms of tuberculosis by the examining physician. It is of interest that in a study of the records of 340 patients with tuberculosis, Maxwell[2] found the average duration of significant symptoms before the recognition of the disease to be a year. In 85 of these there was a history of pleurisy which had been disregarded. Pleurisy has been classed by Jaquerod[3] with initial hemopytsis, as a "happy accident" calling attention to the need of treatment while the prognosis is still good.

Are we as a profession overlooking the fact that unexplained pleurisy with effusion usually means active tuberculosis of the pleura and requires treatment as does any other form of tuberculosis? Do we bear in mind that in young women the age group from eighteen to twenty-five years carries with it the highest incidence of tuberculous disease and that with men the age group of highest morbidity is from twenty-six to thirty-two? We know that mass surveys with tuberculin testing and the x-raying of positive reactors yield the earliest possible diagnosis of minimal tuberculosis. But do we apply that same method of early diagnosis to small units such as the family where there is suspicion of disease or known exposure to it? We know as physicians that tuberculosis is spread by contact. But do we make an effort to pursue all those people closely associated with known cases to find the "open" source of infection, or to detect early disease in other contacts? We have learned in recent years that tuberculosis is more prevalent among medical students, nurses, and other hospital workers than among those whose contacts with the disease are less frequent. But do we give these groups individually the benefit of this knowledge in the needed attention of a periodic clinical and x-ray check-up?

Our knowledge of tuberculosis has taught us that the nature of the small lesion picked up by x-ray — that "spot on the lung" — cannot be accurately estimated with a single observation. We have learned that this x-ray shadow may be an innocent fibrotic scar or a latent lesion lying dormant for weeks to years before finally breaking out into active disease, or that it may represent an early active process which is slowly or rapidly destructive. We know that only repeated x-ray studies and clinical observations, sometimes over a period of years, can determine the true character of these shadows. But do we examining physicians impress our patients with the necessity of this check-up, or do we casually tell them of the "spot" which they may forget? If these facts are borne in mind, the percentage diagnosis of minimal disease will quickly rise from its low level of 13.

A second cause of the poor showing in early diagnosis lies in the failure of our educational program to instruct the patient properly regarding tuberculosis. Organized tuberculosis associations do their share of educational work. But on each family physician rests an enormous burden of responsibility in educating his own patients in the measures of prevention and the means of early diagnosis.

Third in importance in maintaining the present low percentage of minimal cases is the reluctance and the fear of the patient to report to his physician the symptoms which he suspects may be due to tuberculosis. This attitude also must be met by our educational program.

Early minimal tuberculosis may be found in the young and healthy adult although often only by x-ray examination. However we may regard the present national figure of only 13 per cent of tuberculosis diagnosed in the minimal stage, the responsibility for this low figure rests chiefly with the practicing physician.

REFERENCES

1. Council on Medical Education and Hospitals of the American Medical Association: Survey of tuberculosis hospitals and sanatoriums in the United States. J. A. M. A. **105**:1855-1908, 1935.
2. Maxwell, J.: Earlier diagnosis of pulmonary tuberculosis with reference to symptoms. Lancet **1**:186, 1937.
3. Jaquerod, M.: La pleurésie séreuse dite primitive; son importance clinique. Schweiz. med. Wchnschr. **19**:746, 1938.

PEDIATRICS LOOKS AT ADOLESCENCE

ADOLESCENCE, like the glands of internal secretion, the vitamins, athlete's foot and the neuroses, is in danger of becoming another catch phrase; one closely linked to maladjustment, misbehavior and abnormal psychology. Even Charlie McCarthy, irrepressible vox ventris of the ether, excused his own misdeeds in a recent broadcast on the basis of his adolescence.

In expressing a pediatric viewpoint of adolescence in the current issue of the *Harvard Medical Alumni Bulletin*, Garland* makes the distinction between the physical changes that occur in either sex at puberty, and the period of emotional adjustment to life that these changes necessitate. This is the period of adolescence, beginning with puberty and ending when full maturity is reached. Obviously the duration of adolescence must vary according to the intellectual capacity and the social status of the individual, and the degree of civilization of the race.

It is a period of readjustment, of internal expansion and frequently of storm and stress — the *Sturm und Drang* of the German writers — but it is manifestly absurd to think of it as a period of abnormality. It is a period that will create little disturbance with many youngsters, but one during which a wisely directed guiding hand will be of a good deal of assistance to others.

"Restrained and inarticulate," according to this author, "the adolescent no longer reveals his innermost thoughts at home, and thus fails to benefit from the safety valve of a confidential relationship with the parent. . . . The parents have also their reticences. The father, even if he recognizes the desirability of it, cannot talk to this strapping and somewhat arrogant youth as that individual needs to be talked to, nor can the mother approach the daughter according to her needs."

Parents can be instructed in the types of relationship that will bring them closest to their children so that they may serve them best in childhood and adolescence, but in addition the adolescents need

*Garland, J.: Adolescence: a pediatric viewpoint. Harvard Med. Alum. Bull. **13**:92-97, 1939.

some kind of adult companionship that is free from family inhibitions.

It may frequently be the physician who can best serve as parent-substitute, and particularly the pediatrician, if he has dealt wisely with his patients during their childhood. In this terra nova of medical interest he has early staked his claim.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

INVERSION OF THE UTERUS

Mrs. A. B., a twenty-four-year-old para II, was delivered by low forceps on May 9, 1923, nineteen days before the expected date of confinement.

The family history was negative. The patient had undergone all the usual children's diseases but otherwise had had no serious illness. Catamenia began at thirteen, were regular with a twenty-six-day cycle and lasted three days with very slight pain. Her last period was August 18, 1922, making her due on May 28. Her first pregnancy had been uneventful. This pregnancy had been normal except that at two and a half months she had had some flowing with a few pains. She was put to bed and kept there for a month. The remainder of her pregnancy was normal.

On May 9 she started up in normal labor. After one and a half hours of the second stage a diagnosis of an unrotated OLP was made. The vertex was rotated manually, and a forceps was readily applied. The baby was delivered with very slight traction. There was no fresh tear of the perineum, and the uterus acted well. While waiting for the placenta to come away, gentle manipulation of the uterus was performed and at once a mass protruded from the vagina. This was the placenta attached to the inverted uterus. The membranes were readily peeled off, but the placenta was firmly adherent in parts and came off piecemeal. There was practically no bleeding. The interior surface of the uterus was washed with alcohol, and the inverted fundus was readily pushed back into the vagina. A constricting cervix was felt above. By manipulation and gentle pressure up on one side it was seen that the uterus could be pushed back within the cervix. This was gradually accomplished and finally the fundus was pushed up beyond the cervix; the hand was held within the uterus, and ergot was given intramuscularly. As the uterus was felt to contract, the hand was slowly withdrawn. The uterus was washed out with 2000 cc. of salt solution, followed by 1000 cc. of 70 per cent alcohol. At the end of the operation the patient's pulse was 110 and she was in excellent condition.

The convalescence was normal, and she was allowed to get up on the twenty-first day.

Comment. This is a typical case of spontaneous inversion of the uterus. It is very difficult to understand how and why these spontaneous inversions occur; this one was associated with an adherent placenta. It is rather surprising that after the placenta had been separated from the uterus no bleeding occurred and that no symptoms or signs of shock attended the manual removal of the placenta or the replacement of the uterus.

As in most cases of inversion when diagnosed promptly, the reversion was accomplished simply. It is doubtful if today the operator would wash out the uterus with alcohol; the uterus would probably be packed with sterile gauze. Such packs should be removed within twenty-four hours. This patient suffered no hemorrhage so that the need of transfusion did not arise.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

COMMITTEE ON INDUSTRIAL HEALTH

At the last meeting of the Council, Dr. W. Irving Clark, of Worcester, was appointed chairman of the Committee on Industrial Health. This committee is supposed to co-operate with the Council on Industrial Health of the American Medical Association, and information is already being sought by the latter.

Since there is no listing of physicians who are engaged in industrial work in Massachusetts, the committee requests that all physicians who are engaged in full or part-time industrial work mail postcards to Dr. Clark at 1 New Bond Street, Worcester, giving their names, those of the firms with which they are connected and the office addresses of both.

ADVICE TO WOMEN: A DISCUSSION OF THE CYCLE*

The normal age for young girls to become young women, which we speak of as the age of maturity, varies considerably in different countries and different climates. In our temperate zone, if maturity occurs from twelve to sixteen years of age, it may be considered to be within normal limits. Certain perfectly normal girls have matured before twelve, and others after that, but most fall

*A "Green Lights to Health" broadcast given by Dr. Joe V. Meigs on Wednesday, July 5, and sponsored by the Public Education Committee of the Massachusetts Medical Society and the Massachusetts Department of Public Health.

within these limits. Monthly periods do not always come with definite regularity. In the beginning several missed cycles should not be considered abnormal unless this persists. The usual length of the normal period is from two to six days, and the interval between cycles is from twenty-one to thirty-five days, with an average interval of twenty-eight days. There are many variations in the interval, duration of the cycle, and the amount of bleeding. If there is any doubt in the mother's mind, consultation with the family physician should be sought. Perfection is rare, and only unusual difficulties have any importance in young girls.

Absence of cycles is cause for investigation. This difficulty may be due to various reasons — from abnormalities or absence of the proper organs at birth to poor condition of the blood, which we call anemia, or other debilitating diseases. Abnormalities at birth and absence of organs are rare. Poor living conditions, anemia, lack of proper rest and food, and worry are not uncommon causes. It is well known that in serious illnesses — acute and chronic — the cycles may stop entirely until health is restored. Trouble with the thyroid, pituitary or ovarian glands, typhoid fever, rheumatic fever or tuberculosis may cause stoppage. Underdevelopment of the womb is also a cause.

It is not too uncommon to hear of normal cycles starting in girls as young as nine, but such occurrences should not be considered as normal until it has been proved that there is no trouble with a certain gland in the brain or glands in other parts of the body or that there is no tumor of the ovary. A late onset may be normal, or it may mean that the organs responsible for maturity have not developed as they should have. This late onset may be quite important, and its cause should be investigated. If investigation and treatment are delayed too long a girl may be deprived of ever having normal cycles and, therefore, normal reproductive function.

Too many or too few, too long or too short cycles — if they should persist for a year — demand investigation in order to find out whether there is any general or glandular reason for such behavior. Correction of an abnormality is often possible by very simple means. It is infrequent in these times to resort to serious surgical operation in abnormal cycles. Most of the difficulties are not serious and are not caused by real disease.

Discomfort in the lower abdomen and loins and a sense of pressure are often felt at the time of the cycle. Severe pain — that is, enough to cause absence from school or work — is a reason for consultation with the family doctor. Often the pain is exaggerated out of all proportion because of a lack of a simple explanation to the girl and because of the anxiety of the mother. If the pain cannot be relieved by ordinary quieting medicines, surgical procedures guarantee relief in at least 85 per cent of patients. Thus no one should be allowed to suffer enough to need morphine or opium for relief. It is much safer to operate than to rely on opium derivatives.

Sterility in young women is now a problem for intensive investigation of both husband and wife, with a very good possibility that the reason can be found and corrected. Relief of sterility is sometimes impossible, due to permanent changes that have taken place in either the husband or wife. But if none of these are present, relief may be obtained in a high percentage of cases.

As the end of cyclic life, or the menopause, comes on, the same irregularities take place that occur at the onset, except that usually there is no pain. Too long, too short, too frequent or too infrequent cycles often occur. If the change is on the side of short or infrequent cycles nothing need be done; but if the cycle is long or too frequent, an investigation should be made. The difficulty may be simple or functional, but occasionally it may be due to tumors or cancer. As this is the age when cancer is most likely to start, it is well to take no chances. If the abnormality is due to trouble with the glands, sometimes the new hormone or glandular preparations may be successful in relieving the symptoms. If these are unsuccessful, radium or x-ray treatment will nearly always cause a rapid and satisfactory cessation of the cycles. It is in this age — just before the change — that many of our greatest mistakes are made, for women are often lulled by the idea that the difficulty is simply due to a difference occurring at the end of their cycles. An abnormality in cycle or any change in personal hygiene should — after the age of forty — be considered as serious until proved otherwise. By following that rule many disasters can be prevented and many cures of a dread disease can be accomplished.

The use of radium or x-ray treatment is as successful in stopping abnormal cycles as it is in the treatment of cancer. When treatment with any form of radiation is offered, many women refuse to consider it. Or if they do consider it, they feel that the doctor is not telling them the truth. Radium and x-ray have been used for so many years in the treatment of cancer that most women do not realize that they have any other use. Abnormalities of the cycle occurring from forty-five to fifty years of age and due to benign or non-cancerous changes are best treated by radiation, which, by stopping ovarian function, brings on the oncoming change. This artificially produced menopause is not more violent or more serious than the normal, but as it is deliberately brought about it is often more abrupt. The same treatment is as satisfactory for relief of hot flashes and nervousness due to this type of change as in the natural menopause. The female glandular preparations offer an excellent substitute for an ovary which is worn out. Thus, abdominal surgery, which used to be necessary in these conditions, may be avoided and the result is just the same. Advice to have radiation must not be considered as suggesting the presence of cancer. Non-cancerous troubles are relieved more easily than cancerous tumors.

The climacteric or menopause occurs on the average at the age of forty-seven, but it may occur as early as forty or as late as fifty-five. This seems to be a time of great dread and worry for a woman, but it is doubtful if over 5 per cent of women have any serious or even annoying difficulty at this time. Many women never know they have had it except to notice that their cycles have ceased. Often this time and the years succeeding the change are the happiest and most satisfying of all a woman's years. Today this is a more fortunate age than it was a few years ago, for hormones and glandular preparations are now made in such strength that nearly all the symptoms can be relieved or at least diminished. The usual symptoms are flashes, dizziness, nervousness, night sweats, irritability and, sometimes, depression. Treatment by means of the female hormones or gland preparations relieves most of these symptoms with great ease. Often the medicine can be given by mouth, but sometimes it is necessary to give large amounts by injections. The idea that change of voice, excessive growth of hair, obesity, lack of interest or even insanity is due to the menopause is not correct, and only in rare instances does the menopause result in serious disturbances. More courage in approaching this time and faith in modern medicine will do a lot to take away the dread of this period of life.

The onset of any sort of a cycle after the change should

be a cause for alarm, for in many instances tumors are responsible and sometimes they are cancerous. Early diagnosis and treatment may cure even the cancerous ones, and the benign or non-cancerous ones can be easily dealt with successfully. Any return of a cycle after the menopause has once occurred is serious and must be thoroughly and competently investigated.

Women often ask if hysterectomy — or removal of the womb — means that they will change into fat, deep-voiced, hairy individuals. Of course this is not so. There is no doubt but that with the stoppage of ovarian function some changes may occur, but all women are subjected to this hazard at the normal menopause. The surgical or radiation menopause is no different than the natural one, except that it is brought about abruptly. It has been recently shown that the ovaries are of great importance, and removal of them should be avoided if possible. If a woman should be operated on for abnormal cycles or a non-cancerous tumor and if she has not yet reached the menopause, then it is better that the ovaries be left in so that the normal change may take place later. The ovaries are the important structures. It is not necessary for women to be alarmed about their feelings or appearances if the womb alone is removed or even if the ovaries are removed after the menopause has once taken place. Too early removal of the ovaries may be important and bring about changes, but modern glandular treatment can often completely relieve all such symptoms and complaints.

In conclusion I repeat that, in youth, abnormalities of the cycle do not usually need surgery for their cure and that correction can usually be brought about by proper hygiene or medical care; whereas abnormalities of the cycle before, during or after the menopause are most likely to be caused by something wrong with the organs of the body and are therefore of serious consequence. Early and thorough — and emphasis is placed on the word "thorough" — investigation is necessary at or about the time of the menopause if any abnormality of the cycle is noticed. Be alert to notice any changes from the normal! Find out what is causing them but do not be frightened! Almost all these troubles can be righted by methods known to modern medicine. Nature herself will cure many of them if the wise doctor sees to it that she is offered the best chance of so doing.

* * *

Q. Does stopping of the cycles in a young girl mean anything serious? Should advice be sought?

A. Stoppage of the cycles is not serious except as it affects the possibility of fertility. The remote cause of stoppage may be some debilitating disease such as anemia or tuberculosis, and the discovery of the real cause is therefore very important. Any striking change in the cycle should mean medical attention.

Q. What about exercise before, during or after the cycle?

A. Overstrenuous exercise is better avoided, but customary habits need not be changed. It is often noticed that overexercise during a cycle is apt to be followed the next time by a painful one.

Q. How long do menopause symptoms last?

A. Hot flashes, dizziness and night sweats usually last from three months to several years. The severe symptoms usually vanish first, but hot flashes have been known to persist for from fifteen to twenty years. Usually, however, at the end of a year or two most real symptoms are over.

Q. Is it safe to take a tub bath during the cycle?

A. It is safe, but advisable not to, at least for the first two days.

Q. Is it safe to take any of the patent medicines for relief of pain?

A. Any of the simple sedatives, such as aspirin and phenacetin, are safe. It is unsafe to take any "pain killers." They may contain amidopyrine which is bad, because of its danger to the blood-forming organs. Rest, abdominal heat, hot drinks and simple sedatives are best for relief of pain.

DEATH

WHITE — Frank D. White, M.D., of 22 Congress Street, Milford, died August 28. He was in his sixty-sixth year.

Born in New Brunswick, he studied at the University of New Brunswick and received his degree from the University of Vermont College of Medicine in 1897. After practicing for five years in Limestone, Maine, he spent three years studying at the Polyclinic Hospital in New York City.

In 1905 he went to Milford and became a staff member of the Milford Hospital, retiring four years ago because of ill health. Dr. White was a fellow of the Massachusetts Medical Society and the American Medical Association and was a past president of the Thurber Medical Society.

His widow, a daughter and two stepsons survive him.

MISCELLANY

RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR MAY, 1939

DISEASES	MAY 1939	MAY 1938	FIVE-YEAR AVERAGE*
Anterior poliomyelitis	0	0	5
Chickenpox	741	1129	1541
Diphtheria	22	8	27
Dog bite	1447	1107	825
Dysentery, bacillary	5	20	5
German measles	90	74	2262
Gonorrhea	358	366	470
Lobar pneumonia	355	474	417
Measles	4913	1350	3576
Meningococcus meningitis	8	4	15
Mumps	679	977	972
Paratyphoid B fever	0	20	20
Scarlet fever	737	1523	1081
Syphilis	462	507	458
Tuberculosis, pulmonary	248	177	291
Tuberculosis, other forms	29	13	31
Typhoid fever	3	1	7
Undulant fever	4	2	3
Whooping cough	635	478	770

*Based on figures for preceding five years.

RARE DISEASES

Actinomycosis was reported from: Springfield, 1; total, 1.

Diphtheria was reported from: Adams, 1; Boston, 4; Cambridge, 1; Fall River, 1; Lawrence, 8; Methuen, 5; Shrewsbury, 1; Worcester, 1; total, 22.

Dysentery, bacillary, was reported from: Danvers, 4; Westboro, 1; total, 5.

Infectious encephalitis was reported from: Brockton, 1; Chelsea, 1; Needham, 1; total, 3.

Meningococcus meningitis was reported from: Boston, 1; Cambridge, 1; Franklin, 1; New Bedford, 1; Newton, 1; Norwood, 1; Sagamore, 1; Waltham, 1; total, 8.

Pfeiffer bacillus meningitis was reported from Palmer, 1; total, 1.

Septic sore throat was reported from: Arlington, 1; Belmont, 1; Boston, 3; Cambridge, 2; Concord, 2; Chicopee, 1; Everett, 2; Fall River, 1; Gardner, 5; Gloucester, 1; Greenfield, 2; Lynn, 1; Milton, 1; Northampton, 1; Watertown, 1; total, 25.

Tetanus was reported from: Pittsfield, 1; South Middleboro, 1; total 2.

Trachoma was reported from: Boston, 2; total, 2.

Trichinosis was reported from: Boston, 1; total, 1.

Typhoid fever was reported from: Melrose, 1; Quincy, 1; Townsend, 1; total, 3.

Undulant fever was reported from: Gardner, 1; Kingston, 1; Lexington, 1; South Lancaster, 1; total, 4.

No cases of anterior poliomyelitis were reported.

Scarlet fever, diphtheria, German measles, chickenpox and mumps were reported below the five-year average.

Measles and undulant fever were reported above the five-year average.

Lobar pneumonia, pulmonary tuberculosis, tuberculosis (other forms), whooping cough and meningococcus meningitis were reported below the five-year average.

Typhoid fever showed low incidence.

Dog bite was reported at a record high figure. Animal rabies showed record low incidence for the sixth consecutive month. No cases were reported for two consecutive months.

MAINE NEWS

A meeting of the Maine Hospital Association was held at Lakewood on Wednesday, August 30. The morning session included reports of the National Hospital Day Committee, the Executive Committee, the delegate to the American Hospital Association and the Legislative Committee. Dr. Julius Gottlieb, of Lewiston, spoke on "Extension Services of the Bingham Associates," and the paper was discussed by Dr. Samuel H. Proger, of Boston, medical director of the Joseph H. Pratt Diagnostic Hospital, and by others. In the afternoon, Dr. Frank H. Jackson, editor of the *Journal of the Maine Medical Association*, discussed "Hospital Publicity," Dr. Allan Craig, "Public Relations" and Dr. George L. Pratt, president of the Maine Medical Association, "Hospitals and Doctors." These were followed by a panel discussion, the subject being "Improving the Hospital through Evaluation of Professional Standards."

NOTICES

REMOVALS

James M. Baty, M.D., announces the removal of his office to 1101 Beacon Street, Brookline.

Reginald Fitz, M.D., announces the removal of his office to 319 Longwood Avenue, Boston.

WORCESTER DISTRICT MEDICAL SOCIETY

The next meeting of the Worcester District Medical Society will be held at the Belmont Hospital, Worcester, on Wednesday, September 13. The hospital will be open for inspection at 4 p.m., and there will be a demonstration of pneumothorax at 6 p.m. Dinner will be served by the hospital at 6:30 p.m. Following dinner there will be a business and scientific meeting. Dr. Gregory Pincus, visiting professor of experimental zoology, Clark University, will present a paper on "Sex Hormones in Cancer."

George C. Tully, M.D., *Secretary.*

LAWRENCE CANCER CLINIC

The regular Lawrence Cancer Clinic, to be held at the Lawrence General Hospital, 1 Garden Street, Lawrence, on Tuesday, September 19, at 10:00 a.m., will be a demonstration and teaching clinic for physicians, with Channing C. Simmons, of Boston, present as consultant. Physicians of the north half of Essex County are invited to accompany any of their patients whom they desire to have this service or to send them with a note. A report will be returned to every physician who sends a patient. The service is gratis. Any physician is welcome to attend the clinic.

This clinic is endorsed by the Committee on Postgraduate Instruction of the Massachusetts Medical Society.

Roy V. Baketel, M.D.,
Charles J. Burgess, M.D.,
John J. McArdle, M.D.,
Harry H. Nevers, M.D.,
Thomas V. Uniac, M.D.,
J. Forrest Burnham, M.D., *Chairman.*

PENTUCKET ASSOCIATION OF PHYSICIANS

The list of speakers and their subjects that have been scheduled for the 1939–1940 meetings of the Pentucket Association of Physicians is as follows: September 14, "Lessons from the Blood Applicable to Problems of the General Practitioner," Dr. William Dameshek, Boston; October 13, "Surgical Treatment of Peptic Ulcer," Dr. Philemon E. Truesdale, Fall River; November 9, "Pneumonia Today," Dr. Frederick T. Lord, Boston; December 14, "The General Practitioner and the Thyroid Gland," Dr. J. H. Means, Boston; January 11, "Relation of Allergy to the General Practitioner," Dr. John L. Fromer, Boston, and "The Vitamins and Avitaminosis," Dr. John W. Norcross, Boston; February 8, "Studies in Endocrinology," Dr. Fuller Albright, Boston; March 14, "Recent Advances in Orthopedic Surgery," Dr. James W. Sever, Boston; April 11, "Treatment of Migraine and Epilepsy" and "An Improved Method of Making Pneumoencephalograms," Dr. Theodore J. C. von Storch, Boston; May 9, "The Problem of Alcoholism in Its Relation to the Medical Profession," Dr. Robert E. Fleming, Boston, and "Analysis of Alcohol: Its results and relations to conditions and circumstances," Mr. Frank Stratton, Boston; June 27, "Contact Points of Two Professions," Dr. Leroy M. S. Miner, Boston.

The meetings except for that on June 27, which is open, will be held at the Hotel Bartlett (Tel. — Haverhill 3680), 95 Main Street, Haverhill, at 8:30 in the evening.

SOCIETY MEETINGS AND CONFERENCES

Calendar of Boston District for the Week Beginning Monday, September 11

Tuesday, September 12

•10 a.m.–12:30 p.m. Boston Dispensary tumor clinic.

Friday, September 15

•10 a.m.–12:30 p.m. Boston Dispensary tumor clinic.

Saturday, September 16

•10 a.m.–12 m. Staff rounds of the Peter Bent Brigham Hospital. Conducted by Dr. Soma Weiss.

•Open to the medical profession.

September 11–15 — American Congress on Obstetrics and Gynecology. Page 938, issue of December 8.

September 14–16 — Biological Photographic Association. Page 941, issue of June 1.

SEPTEMBER 14–JUNE 27 — Pentucket Association of Physicians. Page 400.

SEPTEMBER 15–28 — Pan-Pacific Surgical Association. Page 863, issue of November 24.

SEPTEMBER 19 — Lawrence Cancer Clinic. Page 400.

SEPTEMBER 29–30 — New England Surgical Society. Beverly and Salem.

OCTOBER 23–NOVEMBER 3 — New York Academy of Medicine. Page 977, issue of June 8.

FALL, 1939 — Temperature Symposium. Page 218, issue of February 2.

DECEMBER 2 — American Board of Obstetrics and Gynecology. Page 1019, issue of June 15.

JANUARY 6, JUNE 8–11, 1940 — American Board of Obstetrics and Gynecology. Page 160, issue of July 27.

MARCH 7–9, 1940 — The New England Hospital Association. Hotel Statler, Boston.

MAY 14, 1940 — Pharmacopoeial Convention. Page 894, issue of May 25.

JUNE 7–9, 1940 — American Board of Obstetrics and Gynecology. Page 1019, issue of June 15.

DISTRICT MEDICAL SOCIETY

WORCESTER

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BOOKS RECEIVED FOR REVIEW

The Social Function of Science. J. D. Bernal. 482 pp. New York: The Macmillan Co., 1939. $3.50.

Do You Want to Become a Doctor? Morris Fishbein. 176 pp. New York: Frederick A. Stokes Co., 1939. $1.50.

Functional Disorders of the Foot: Their diagnosis and treatment. Frank D. Dickson and Rex L. Diveley. 305 pp. Philadelphia, Montreal and London: J. B. Lippincott Co., 1939. $5.00.

The Art of Anaesthesia. Paluel J. Flagg. Sixth edition revised. 491 pp. Philadelphia, London and Montreal: J. B. Lippincott Co., 1939. $6.00.

District Health Development: Building program as related to the master plan for the City of New York. Department of Health, City of New York. 53 pp. New York: Neighborhood Health Development, Inc., 1939. $1.00.

Housing Yearbook 1939. Edited by Coleman Woodbury. 240 pp. Chicago: National Association of Housing Officials, 1939. $3.00.

New and Nonofficial Remedies, 1939: Containing descriptions of the articles which stand accepted by the Council on Pharmacy and Chemistry of the American Medical Association on January 1, 1939. 617 pp. Chicago: American Medical Association, 1939. $1.50.

Annual Reprint of the Reports of the Council on Pharmacy and Chemistry of the American Medical Association for 1938: With the comments that have appeared in the Journal. 123 pp. Chicago: American Medical Association, 1939. $1.00.

The Story of a Baby. Marie H. Ets. 63 pp. New York: The Viking Press, 1939. $2.50.

Operative Orthopedics. Willis C. Campbell. 1154 pp. St. Louis: The C. V. Mosby Co., 1939. $12.50.

Peripheral Vascular Diseases: Diagnosis and treatment. William S. Collens and Nathan D. Wilensky. 243 pp. Springfield, Illinois, and Baltimore: Charles C Thomas, 1939. $4.50.

Cardiovascular Diseases: Their diagnosis and treatment. David Scherf and Linn J. Boyd. 458 pp. St. Louis: The C. V. Mosby Co., 1939. $6.25.

The Poison Trail. William F. Boos. 380 pp. Boston and New York: Hale, Cushman and Flint, 1939. $3.00.

Pneumonia: With special reference to pneumococcus lobar pneumonia. Roderick Heffron. 1086 pp. New York: The Commonwealth Fund, 1939. $4.50.

The Rockefeller Foundation: Annual report, 1938. 515 pp. New York: The Rockefeller Foundation, 1939.

The Surgery of Pain. René Leriche. Translated and edited by Archibald Young. 512 pp. Baltimore: The Williams & Wilkins Co., 1939. $6.50.

Modern Clinical Psychiatry. Arthur P. Noyes. Second edition. 570 pp. Philadelphia and London: W. B. Saunders Co., 1939. $5.00.

Studies from the Rockefeller Institute for Medical Research. Vol. 112. 600 pp. New York: The Rockefeller Institute for Medical Research, 1939. $2.00.

Aids to Dermatology and Venereal Disease. Robert M. B. Mackenna. Second edition. 284 pp. Baltimore: The Williams & Wilkins Co., 1939. $1.25.

Sterility and Impaired Fertility: Pathogenesis, diagnosis and treatment. Cedric Lane-Roberts, Albert Sharman, Kenneth Walker, and B. P. Wiesner. 419 pp. New York: Paul B. Hoeber, Inc., 1939. $5.50.

Nutrition and Physical Degeneration: A comparison of primitive and modern diets and their effects. Weston A. Price. 431 pp. New York and London: Paul B. Hoeber, Inc., 1939. $5.00.

Clinical Diagnosis by Laboratory Methods: A working manual of clinical pathology. James C. Todd and Arthur H. Sanford. Ninth edition. 841 pp. Philadelphia and London: W. B. Saunders Co., 1939. $6.00.

Symposium on the Synapse. Herbert S. Gasser, Joseph Erlanger, Detlev W. Bronk, Rafael L. De Nó, and Alexander Forbes. 474 pp. Springfield, Illinois, and Baltimore: Charles C Thomas, 1939. $2.00.

BOOK REVIEWS

Chronic Diseases of the Abdomen: A diagnostic system. C. Jennings Marshall. 247 pp. Boston: Little, Brown & Co., 1939. $6.00.

This book starts badly but improves as it goes along. The verbosity and indirection of the author's introduction might frighten one off, but subsequently the book becomes as readable as a diagnostic system can be. It is carefully planned, is inclusive enough for the practitioner and student and is a handy check list of diagnostic staples for the surgeon.

On the whole it is sound. The reviewer disagrees with certain parts. For example, many of us believe that there may be something in chronic appendicitis. The book's analysis of cholecystic indigestion helps the neophyte less than would a vivid description of an attack of colic. In eleven pages on backache there are but two noncommittal lines on nucleus pulposus. Minor inaccuracies are found in the discussion of diverticulitis. The views on extrinsic ureteral obstruction are a bit conservative, at least according to the standards of most urologists.

The most important thing about the book is the subject, for which there has never been an authoritative text. Popularity is a safe prediction, despite a charge which is high for the size of the book.

Varicose Veins. Alton Ochsner and Howard Mahorner. 147 pp. St. Louis: The C. V. Mosby Co., 1939. $3.00.

This little book is, in the main, an amplification of the authors' recent papers dealing with the study of varicose veins and their treatment by combined division and injection. In an introductory chapter, which is particularly interesting because of its illustrations depicting earlier surgical procedures, they discuss the historical aspects of the subject. Of the succeeding brief chapters dealing with anatomy, etiology, pathology, physiology and clinical aspects, the best is the one which describes the anatomic features of the venous system of the lower limbs. The various veins which drain into the upper great saphenous vein and into the femoral vein just proximal to it are described with unusual accuracy and completeness — particularly in relation to high division and postoperative recurrences. One notes by contrast the brief account

of the veins which communicate between the superficial and deep venous systems of the calves. Indeed, in the entire book, the authors pay very little attention to these communicating veins, devoting themselves especially to the corresponding vessels of the thigh. Little notice is taken, either, of the abundance and stability of the deep veins as compared with the superficial ones.

The chapter devoted to examination of the varicose-vein patient constitutes the feature of the work. In this, the tests for evaluating the venous circulation are very fully described and illustrated, more particularly the authors' "comparative tourniquet test," based upon the Perthes and Brodie–Trendelenburg tests. It will be noticed that they give Sir Benjamin Brodie credit for anticipating by some forty years Trendelenburg's observation of the reflux of blood down the varicose vein. Upon the comparative tourniquet test, which reveals the relation of the varicose veins to the deep and communicating veins of the thigh, the authors base their determination of what further division of varicose veins is needed over and above their routine resection at the junction of the great saphenous and the femoral veins. Their plan is intended to make the least possible surgery secure the greatest possible safety and permanence. The operative steps are well illustrated, the method of injecting the preferred sclerosing soaps are well described and the aftertreatment is given adequate attention.

The book will undoubtedly be of great value to those desiring to make the most thorough study of varix and treat it in an ideal way. However, many will find the tests described elaborate and difficult to carry out with accuracy. Indeed, it is perhaps a pity that, with their great knowledge of the subject, the authors have omitted some commonplace observations and deductions, such as the meaning of cyanosis or its absence in estimating the state of the deep veins. They give almost no time to thrombosis in the varicose vein, its natural course and treatment, and they say nothing of the management of the not infrequent troublesome secondary thromboses which may wander down into the calf when high division and injection alone have been performed.

The material is attractively presented, with the vigor and intelligence for which the authors are well known.

Clinical Pathological Gynecology. J. Thornwell Witherspoon. 400 pp. Philadelphia: Lea & Febiger, 1939. $6.50.

This book is divided into twenty-seven chapters. The anatomical classification is used throughout. The general plan followed under each organ covers infections, tumors, histopathology and the treatment of each lesion.

Under Sections 5 and 6 the hormones are discussed. Considerable material is condensed in these two sections, and they give a very good idea of our knowledge of the hormones. The clinical application of the hormonal products, as we understand them, is also well given and should be clear to the medical student and clinician who have had no great laboratory experience.

The photomicrographs are original and well selected, and they satisfactorily illustrate each condition. Most of the gross anatomical descriptions are reproduced from other authors and have also been well chosen.

The section on cancer of the uterus should be of distinct advantage to the medical student as it is well discussed and illustrated in a limited space. Menstruation and its disorders cover 38 pages, and the author emphasizes the relation of the female sex hormones as they are applied to the treatment of these conditions. This portion of the book is exceptionally good.

It is stated under abortion that packing of the cervix and vagina is most easily accomplished with the patient in the knee-chest position, the Sims position being the second choice. A large number of obstetricians and gynecologists would not agree with this statement since most of them place the patient in the lithotomy position and use a weighted speculum in performing uterovaginal tamponade. Emphasis is rightly placed on the fact that the curet is a dangerous instrument in any pregnant uterus.

The treatment of hydatid mole is given as emptying the uterus from below. No mention is made of abdominal hysterotomy, which has now become an accepted procedure in many clinics.

Classification of the tumors of the ovary is based on the histogenesis of these tumors with but few exceptions. It is simple and should be understandable to the medical student. Under pseudomucinous cystadenoma the author states that blind tapping of these cysts is a dangerous procedure since, in the presence of cancer, malignant cells may be implanted on the peritoneum. However, in the same chapter he advises, in the presence of large tumors which may require an incision from the symphysis to the xiphoid, making a small incision, rather than a long one, before tapping the cyst under direct vision. Many surgeons believe that tapping any cyst, even under direct vision, is a dangerous procedure because of the possibility of spilling malignant cells in the peritoneal cavity and that an incision as long as one from the symphysis to the xiphoid will heal satisfactorily and is much safer than the tapping of a cyst, as it is impossible to say whether or not cancer exists in the interior of the tumor.

On the whole the book is clearly written, with the material well presented, and should prove of marked value to the medical student and general practitioner — probably to a less extent to the specialist. While a great deal of the subject matter may be found in the large textbooks, it is difficult to find any volume which condenses it and makes it as readily accessible as has been done in this book.

Man and His Body. Howard W. Haggard. 594 pp. New York and London: Harper & Brothers Publishers, 1938. $4.00.

The layman who nowadays fails to learn something of the structure of his body and its behavior in health and disease has no one but himself to blame. If there were no other book than this of Haggard's available to him, he could acquire all, more than all, that he need know along this line. For this is an up-to-date, thoroughly trustworthy treatise of most extraordinary range. It is not confined to the setting forth of the essential facts as to structure, function, hygiene and development; many of the diseases to which the flesh is heir are discussed, together with matters of diet, exercise, posture, the effects of alcohol and drugs, allergy, endocrinology, sexual activities, climate and air-conditioning, and the principles of heredity. There is even an appendix on medical terminology.

It is important to add that the presentation is well adapted to the average intelligent reader, even though the latter has had no grounding in the subjects treated. Yet it is sufficiently scientific in matter and style to serve as an excellent treatise for the medical student, at least in the preclinical phase of his education. It is a book which may be cordially recommended and which deserves, indeed, to have a wide circulation.